COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

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The Balance Sheet for 1935

IN THE DAYS when neither increasing efficiency nor the inroads of competitive sources of energy were factors of moment, the bare record of tonnage gains or losses furnished a reasonably adequate yardstick of year-to-year progress in the coal-mining industry. But, in these unusual times, production figures may not tell the whole story. Such figures may be measurably less important as indices to future trends than developments less readily reducible to purely statistical bases.

The year closed is a case in point. Were tonnage the sole yardstick of progress, the record would not be particularly inspiring. Bituminous output was only 2.4 per cent ahead of 1934 and that increase was due primarily to greater activity in steel and the building up of consumer storage stocks. Anthracite tonnage, exclusive of the stolen coal which eludes formal production records, was less than in the preceding year, although larger than in 1933.

Actually, however, these figures lose much of their possible trend significance by the continued development of forces which should have a much greater influence upon the future of the industry. Underground mechanization—the development which enabled Mid-Western mines to survive during the era of excessive disparity in wage rates between what then were union and non-union fields—has been making real headway in the Appalachian area in the past year. Further expansion appears inevitable and, as this movement spreads, appreciation of its great potentialities as a weapon for the industry as a whole in fighting competition of rival fuels should grow.

Noteworthy strides also have been made in preparation. Slide-rule purchasers may complain that beneficiation is overdone, but the producer interested in selling above slaughter levels knows the appeal modern cleaning, sizing and dustless treatment makes to the consumer. As a result, last year saw activity in this phase of bituminous development unmatched since 1931. If anthracite seemed more laggard, the explanation lies in the fact that modernization in hard-coal preparation had a headstart on bituminous years ago; anthracite developments of 1935, therefore, were generally in the nature of further refinements.

While these, perhaps, are the most spectacular developments, progress also is reflected in the field reports on other engineering achievements. Stripping continues to push forward with larger shovels for removing overburden and increasing employment of trucks and trailers in moving coal from the pit to the cleaning plant. Use of light-weight aluminum and steel alloys is growing. Refinements in design to speed efficiency and prolong useful life are outstanding in many of the late developments in mining equipment.

This summary of engineering progress, which is treated in more detail in the review articles which follow, shows clearly that the industry has not been backward in strengthening its technical defenses. Much, of course, still must be done because the very essence of progress is movement and change. What remains to be considered is how the industry best may capitalize upon present improvements and others yet to come so that tonnage may be increased without sacrifice of reasonable profit, fair wages or curtailment of adequate service to the buyer. This means employment of a merchandising skill which recognizes that performance as well as price enters into the determination of real fuel values.

Because it is so easy—and frequently so disastrous—to let price carry the entire load, there is insistent demand from those who doubt or fear the efficacy of the jungle law for some sta-

bilizing measure which will put a bottom on prices. Hence the district selling agency and the Bituminous Coal Conservation Act of 1935; hence the policing measures voluntarily undertaken by anthracite producers. That some influence powerful enough to protect the industry from itself is desirable is unquestionable. To imagine that statutes can protect the industry from outside competition, however, is to invite stagnation and ultimate extinction. That protection is a fighting job in which price and service are shield and buckler.

Much has been done—mostly by scattered groups—to establish this protection. What is needed now is a quickening of tempo, greater cohesion and also greater willingness to translate plans into action. Broadening of technical service to the consumer is one line of attack worthy of pursuit. More whole-hearted support of such aids to consumer satisfaction as the domestic stoker is another. And beyond these immediate raw-fuel markets looms the frontier of new uses opened up by research, which, after long neglect, is now engaging the attention and financial support of the industry on an organized commercial basis.

All these developments augur well for the industry in 1936. There are still many as yet unconquered problems and as one is licked another will take its place. But problems supply a needed stimulus to managerial ingenuity and engineering skill. They test stamina and encourage imagination to soar without losing grip on realities. A fighting industry can ask no sharper spur to further progress.

Tipple Dust in Mines

EFFORT should be made to reduce the dust from dumps, screens and tables in tipples and to keep it from entering the mines by the intake, which in shaft mines in this country usually is the hoistway or haulageway. If coal is dumped and prepared at a sufficient distance from the entering point of the air, the intake hoistway and haulageway should be free of all dust but that of the outside atmosphere, but with a dusty tipple, dust particles of many sizes will enter the mines.

Those a micron in diameter are said to fall only six feet in eight hours when the air in which they float is still. When it is not still, they never fall, and they and the heavier particles are likely to enter the mine, where they will create an explosive hazard as well as make the air less fit to breathe. The larger dusts, though not carried so far, nevertheless may enter the mine and settle on timber, floor and ribs, whence they may be raised either by the passage of trips of cars or by an explosion. This may rarely be a direct cause for an explosion, the dust hazard at the face being far greater, but it may account partly for the spread of flame in the intake and it may increase the cost of maintaining a safe coating of rock dust.

Bronchitis and Sequelae

DR. J. S. HALDANE has suggested that bronchitis may predispose the lungs to silicosis. Studies are being made into this possibility at the Harvey Laboratory, St. Bartholomew's Hospital, London, by Dr. F. Haynes, who, finding that inhalation of concentrations of oxygen cause marked reactions in the pulmonary alveoli, hints that lungs may be rendered defenseless by the loss of the fine hairs in the bronchial epithelial cells, which thus are rendered small goblets for the retention of mucus. He is creating a type of bronchitis in animals to ascertain if, thereafter, silicosis and other pulmonary damage are likely to supervene. Nitric acid is also being used because that gas results from shotfiring; hence miners are exposed to it.

In the Ontario mines care is being taken to protect miners, on leaving their work, from the rigors of the climate, and in South Wales the relation between the riding of men in mantrips up intake slopes in the cold air of winter is being somewhat definitely linked with silicosis. These studies, though by no means complete, advise, and almost dictate, that conditions in mines having any silicosis hazard be arranged so that the men heated by their work will not be chilled in reaching the bath house, and will be so cooled by the time they leave it that they will not catch cold going home.

It is significant that the regions where silicosis has been rampant have been those where the temperatures of the surface are much lower at times than those of the depths of the mine. This relation cannot be pressed too closely because the dustiness of the work, the percentage and harmfulness of the silica, the human resistance and the conditions of employment vary from mine to mine.

REGULATION

+ Dominates Economic Picture in 1935

SET ADRIFT by the scuttling of NRA in May, the bituminous industry of the country found itself thrust into a search for other means of stabilizing price and competitive relationships in 1935. Subsequent developments disclosed no appreciable weakening in general acceptance of the principle of appropriate independent control over the wage and marketing policies of the soft-coal industry but did bring out a definite split over the method of control to be employed. Administration of the coup de grâce to NRA by the Supreme Court of the United States in the *Schechter* case left the field open to legislative proposals specifically applicable to soft coal, and thus brought the Guffey-Snyder bill to the fore. Supported by one operator camp and strenuously opposed by another, this bill, substantially modified and bearing the Presidential benediction, squeaked through in the closing days of the last session of Congress and became the Bituminous Coal Conservation Act of 1935 on Aug. 30. Opponents immediately took it into court on constitutional grounds.

Price Trends Mixed

Mixed trends marked bituminous price changes in 1935, reflecting the termination of the control established under NRA, increases in wages effective Oct. 1 and the consummation of a number of contracts embodying substantial price concessions. As a result of the combined action of these forces, available information indicates that the 1935 level of realization was hardly more and possibly less than in 1934, although still substantially higher than in pre-code days. The contract situation, in fact, came into the limelight even before the end of NRA and the last days of code operation were marked by the initiation of measures to preserve the price structure precipitated by claims of the United Mine Workers that widespread consummation of contracts for delivery after the NRA expiration date of June 16 at less than code prices was imperilling price maintenance and in turn the wage structure of the industry.

Substitute fuels and sources of energy continued to be a major thorn in the side of the industry, and again registered gains at the expense of coal. These gains were met, however, by a strengthening of previously adopted defenses and the establishment of new research and promotional organizations and campaigns to foster coal use. Substantial increases in stoker sales were still another bright spot in both the bituminous and anthracite pictures.

Bituminous Output Up

Soft coal again registered an increase in 1936, largely due to additions to stocks and increased consumption for the manufacture of pig iron, which not only brought the tonnage up but apparently compensated for losses in other directions. Total bituminous output, according to preliminary estimates by the U. S. Bureau of Mines, was 368,120,000 tons in 1935, an increase of 8,752,000 tons, or 2.4 per cent, over the 1934 output of 359,368,000 tons. The 1935 output was 10.3 per cent more than the 1933 total of 333,631,000 tons.

Industrial stocks of bituminous coal on Dec. 1, 1935, according to the U. S. Bureau of Mines, totaled 30,489,000 tons, against 26,456,000 tons on Dec. 1, 1934. Stocks on lake docks, on the contrary, decreased from 9,024,000 tons on Dec. 1, 1934, to 8,228,000 tons on Dec. 1, 1935. Production of pig iron registered an increase of approximately 33⅓ per cent in 1935, with consequent rise in coal consumption to about 30,830,000 tons, against 23,120,000 tons in 1934. Lake coal shipments declined slightly during the year to a total (cargo and fuel) of 35,837,450 tons, compared with 35,971,146 tons in 1934. Railroad locomotive consumption of coal also was down slightly to approximately 69,900,000 tons in 1935, a decline of 0.6 per cent from the 1934 consumption of 70,322,000 tons. Utilities, on the other hand, increased their consumption of coal from 33,555,000 tons in 1934 to approximately 34,400,000 tons in 1935, or 2.5 per cent.

On the production side, the anthracite industry suffered a substantial setback in 1935. Total legitimate output (excluding a bootleg production of some millions of tons) was 51,003,000 net tons, a decrease of 6,165,000 tons, or 10.8 per cent, from the 1934 total of 57,168,000 tons. The 1935 output, however, was 3 per cent greater than the 1933 total of 49,541,000 tons. Production figures, however, do not tell the whole tale, as the year was marked by substantial contributions to future stability on a profitable basis, not the least of which was the adoption of the principle of concerted action on major problems facing the industry.

One of the principal fruits of this program of cooperation was the adoption of a plan for eliminating price juggling and other unfair competitive practices tending to destroy confidence among producers, distributors and consumers. Under this plan, adopted in June, prices, terms of sale and sales policies are filed with the Anthracite Institute by signatory producers. The institute in turn makes them available for inspection and transmits them to participating producers and their customers, who pay their pro rata cost of the service. Administration of the plan was placed in the hands of Charles F. Huber, who resigned as chairman of the board of the Glen Alden Coal Co. to take over this job.

Anthracite Attacks Bootlegging

Supplementing this attack on influences tending to demoralize markets, anthracite producers embarked on a concerted drive to eliminate bootleg tonnage, representing not only a direct loss to legitimate producers and their employees but also an indirect penalty through its unsettling effect in consuming centers. Efforts were directed largely toward impressing the seriousness of the problem on State and local authorities, retailers, business and civic organizations, and the public in Pennsylvania and other consuming States as a preliminary to requests for specific measures directed toward halting the activity. Substantial progress was made, promising if not complete elimination, at least a substantial reduction in illegal output.

Often put forward in past years, a

cooperative sales promotion and advertising program for anthracite received the support of a substantial number of producers in 1935, and indications pointed to its eventual adoption. Individual operators put even more force behind research and promotional campaigns, and the work of the various service and research departments of the Anthracite Institute was pressed with unabated vigor.

Abdication of the insurgent United Anthracite Miners of Pennsylvania removed still another disturbing factor from the anthracite picture in 1935. Ending two years of existence marked by open warfare resulting in a number of deaths and widespread property damage, the insurgent union made known its decision to disband in October because of dwindling membership and lack of finances. This left the field to the United Mine Workers, which proposed at its tri-district convention in Washington, D. C., in December, a new two-year agreement to replace the present contract expiring March 31, 1936, embodying a six-hour day, five-day week, a "substantial increase in wage scales" and a number of changes in working conditions. Attempts to bind the union to a strike in case the demands were not granted were smothered by officials, who pointed to disastrous consequences of a stoppage of any duration.

Bituminous Code Bolstered

Raising the curtain on developments in bituminous regulation in 1935, hearings on a proposed amendment to the NRA code of fair practices then in force were called in January to forestall a collapse of the price structure. At the same time, the industry and the National Industrial Recovery Board, which replaced the original NRA administrator, came into conflict over the question of whether the power of determining minimum prices should remain in the hands of the industry or be transferred to the NIRB. The industry won the price-control argument and approved a code amendment outlawing the making of contracts for future delivery at prices below those established under the code at the time the contract was signed, or any sale of coal below established prices. Later in the month, approval was given to the establishment of arbitration boards to pass upon individual price adjustments and interdistrict correlations, which thorny problems previously had been taken care of by the "Adams plan."

With the above two amendments in effect, operations under the code (which became operative Oct. 2, 1933) proceeded on a fairly even keel until May 27, when a unanimous decision of the Supreme Court in the *Schechter Poultry* case wiped out the entire code system and wrecked the administration's chief recovery measure. With the passing of NRA in its original form, plans of the majority of the bituminous industry for an extension of NIRA after its official expiration date of June 16, with modifications, went glimmering and the Guffey-Snyder bill moved into the limelight.

Offered in Congress on Jan. 24, the Guffey-Snyder measure included in slightly modified form the allocation and mine-quota scheme proposed in earlier sessions of Congress by Senator Hayden of Arizona and Representative Lewis of Maryland, which had its inspiration in the British Coal Mines Act of 1930. The Guffey-Snyder measure declared coal to be "affected with a national public interest" and called for its regulation as a public utility. Regulatory provisions of the measure were restricted to Title I, which provided for: establishment of a National Bituminous Coal Commission of five members appointed by the President; establishment of a Bituminous Coal Labor Board of three members appointed by the President; establishment of a code of fair practice embodying production allocation, district and mine quotas, price-fixing provisions and other marketing regulations; a tax of 25 per cent of the mine price with a 99-per-cent drawback to producers accepting the code, who would be excused from the provisions of the anti-trust law, protection of the collective bargaining rights of employees, and administration of the code by a national and 24 district operator boards.

Title II of the bill provided for the creation of a National Bituminous Coal Reserve to control existing federal lands containing coal deposits and purchase privately owned undeveloped acreage and mines with funds from a federal bond issue to be liquidated by a tonnage tax. Sixty per cent of the tax, however, was earmarked for expenditure under the direction of the President for rehabilitation of miners thrown out of work through retirement of coal lands as provided in the title. Messrs. Hayden and Lewis later offered a substantially similar measure broadened to take in anthracite also. This measure, however, never came up for a vote.

Senate Gets Guffey-Snyder Bill

After hearings, the Guffey version was favorably reported to the Senate on April 2 with revisions to increase commission membership, reduce the number of producing districts to 21, place determination of minimum prices in the first instance in the hands of district boards of producers rather than in the hands of the commission; and define minimum price as the average production cost of 90 per cent of the tonnage in the district, the 10 per cent highest-cost output being eliminated. Also, the clause designating the industry as a public utility was discarded and a provision that working hours established by a majority of the tonnage and of the employees in the industry would be binding on the entire industry was modified to require at least two-thirds of the tonnage. As finally passed, the same revision was made in the tonnage necessary to establish minimum wage rates.

Further revisions were made after the Schechter decision, which threw the National Conference of Bituminous Coal Operators solidly behind the bill, with modifications, and developed equally firm opposition in the National Committee in Opposition to the Guffey Coal Monopoly Bill and for the Extension and Strengthening of NRA, which later yielded the torch to the Committee Against the Guffey Bill. These revisions included: elimination of detailed provisions for allocation of district and mine tonnages and substitution therefor of a mandate on the commission to study and report on the feasibility of production control and allocation to Congress not later than Jan. 6, 1936, and relation of cost determinations and price-fixing to nine minimum-price areas, coupled with a prescription that minimum prices were to be equal as nearly as possible and not less than average weighted costs in the areas.

Bituminous Coal Reserve Killed

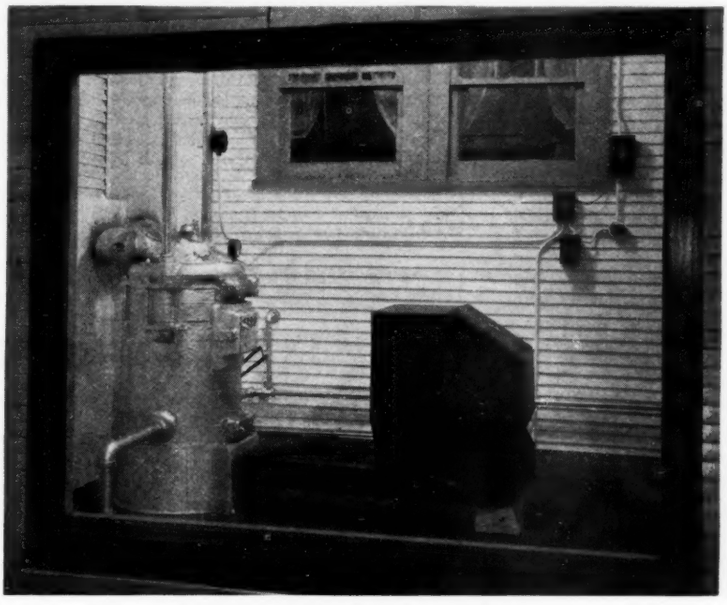
With these revisions, the bill was taken in hand by a subcommittee of the House Ways and Means Committee, where it pursued a stormy path between public hearings and committee deliberations, and for a time appeared likely to be wrecked on the rock of constitutionality. With an assist from the President, however, who requested the subcommittee not to "permit doubts as to constitutionality, however reasonable, to block the suggested legislation," it was finally brought onto the House floor with a "must" tag on it. In the course of committee deliberations, the tax was reduced from 25 per cent with a 99-per-cent drawback to 15 per cent with a 90-per-cent drawback, operator and miner representation on the commission was discarded, the number of commissioners was reduced to five, and the following provisions were eliminated: all of Title II, a proposal to deny producers refusing to subscribe to Title I the use of the mails and a section making extension of railroad facilities to mines dependent upon commission approval. A provision outlawing delivery of coal on any contract made prior to the effective date of the act at less than code prices was adopted, along with a provision declaring marketing agencies determining prices in interstate commerce unlawful combinations in restraint of trade unless approved by the commission. Twenty-three bituminous districts grouped into nine minimum-price areas were set up.

As finally drafted by the House committee, the measure went through the House and Senate with very few

changes, one of which eliminated language giving complying producers or marketing agencies or boards immunity from the anti-trust laws. The final draft of the act, signed by the President Aug. 30, also set up the office of Consumers' Counsel to the National Bituminous Coal Commission with the function of protecting the public's interest under the act.

The first legal attack on the new law was made before the ink was hardly dry on the President's signature by James Walter Carter, president, Carter Coal Co., who brought suit in the District of Columbia Supreme Court to prevent his company from becoming a code member. The law, Mr. Carter charged, was unconstitutional in that it attempts government regulation of intrastate commerce by exacting or withholding a heavy penalty, called a tax. Furthermore, he contended, the law violates the commerce clause of the Constitution in that its regulations as applied to the Carter company cover wholly intrastate business, and also transgresses the Tenth Amendment in invading a field of regulation reserved to the States or to the people, as well as the Fifth Amendment in attempting to deprive him, the plaintiff, of the liberty guaranteed by the amendment without due process of law, the company of its property rights, including existing contracts, and in attempting to take the private property of the company for public use without just compensation. Finally, Mr. Carter charged, the act "is wholly arbitrary, capricious and unequal."

On Sept. 10, the R. C. Tway Coal Co. and fifteen other eastern Kentucky companies filed suit in the Federal District Court at Louisville to enjoin the Kentucky district collector of internal revenue on the ground of unconstitutionality. Points made in the petition included violation of the Fifth and Tenth amendments, attempted delegation of legislative power, unconstitutional use of the taxing power by Congress to punish non-compliers and unlawful assumption of power by Congress to fix maximum and minimum prices, require producers to sell to all customers similarly circumstanced at the same price, declare invalid all contracts previously made which conflict with the act, limit contracts made before completion of the code to 30 days' duration, regulate employer-employee relations and fix wages and hours. Opposing the declaration of Congress that producing and selling coal is affected with a public interest, the companies asked for judgments of unconstitutionality against the act and specifically against Sec. 4 (providing for the code) and the tax levying and refunding sections, and for an injunction against collection of the taxes. On Sept. 19, the stage was set for a decision on strictly constitutional grounds when a Tway stockholder filed suit in the same court defending the constitutionality of the act and asking for a decree declaring it to be duty for the company to accept the code and operate under its provisions. With the Carter and Tway cases as examples, more than eighty other companies filed suits against the act in the remaining weeks of 1935.



On the Firing Line in Memphis

This stoker not only catches the eyes of prospective customers but also heats the offices of the McDonald Coal & Ice Co.

Preliminary skirmishes were won by the government in November. In the Tway and related cases, the right of Congress to enact regulatory measures was upheld in a sweeping decision handed down by Judge Elwood Hamilton on Nov. 14. A split verdict, however, was rendered in the Carter case by Justice Jesse Adkins, who upheld the price-control provisions of the act in an oral opinion handed down Nov. 27, but declared the labor sections invalid. In the Carter case, Justice Adkins had previously (Oct. 30) refused to enjoin internal revenue agents, but did issue an injunction *pendente lite* against them, at the same time requiring Mr. Carter to post a bond for $15,000 to indemnify the company for any loss it might suffer as a non-code member. In handing down his decision in the Tway case, Judge Hamilton issued a stay against the 13½ per cent penalty imposed for non-compliance with the act, pending determination of an appeal by the companies, which were directed to pay the 1½ per cent tax levied on complying companies to the court, plus 1 per cent of the latter amount as costs, until the constitutionality issue is settled.

The major portion of the subsequent suits resulted in the issuance of restraining orders against collection of the 13½ per cent penalty, although the courts, with one or two exceptions, declined to rule on the constitutionality of the law. To clarify the situation as quickly as possible, the U. S. Supreme Court decided on Dec. 23 to grant a quick test of the validity of the law in response to a joint request by the government and counsel for James Walter Carter, the R. C. Tway Coal Co. and nineteen other operators in the Harlan field of Kentucky. This action obviated recourse to the circuit courts of appeals in these cases. With a test in the Supreme Court assured, a number of code members went into the courts for orders to protect themselves against loss of the 1½ per cent tax in event of a decision against the act. In most cases, they were directed to place the payments in escrow.

Legal tests were not the only thorns in the path of the new statute, as funds for administrative purposes went by the board when a filibuster led by the late Senator Long of Louisiana prevented passage of the deficiency appropriation measure including them, in the closing days of the last Congressional session. Commission and labor board members were appointed on Sept. 20, however, and immediately assumed their duties. On Oct. 9, the commission issued General Orders 1 to 3, inclusive, promulgating the Bituminous Coal Code provided for in Sec. 4 of the act, outlining the manner of acceptance of the code and naming temporary deputy secretaries in each of the 23 districts to call meetings of producers for the purpose of setting up district boards. The status of district sales agencies was defined in General Order No. 4, issued Oct. 23.

Organization of district boards was rapidly completed in all but District 21 (North and South Dakota), an industry advisory board was chosen and the

first public hearing was held on Nov. 21-22 to consider the feasibility of prescribing uniform methods of classification and limiting the number of sizes in Minimum-Price Area No. 1.

General Order No. 5 came out on Oct. 24, naming the United Mine Workers as representing the preponderant number of employees in the industry and designating the district president in each of the 23 districts as employee representative on the district board. General Order No. 6 deferred reporting of sales information pending establishment of rules and regulations for maintaining its confidential character, while No. 7, issued Nov. 22, provided for establishment of a statistical bureau by each district board. Such bureaus had been approved in all but two districts—No. 13 (Alabama, Georgia and southern Tennessee) and No. 21 (North and South Dakota), where no board was organized—up to Jan. 18, 1936. General Order No. 8, issued Nov. 23, prescribed rules for the qualification of district board directors and employees, and statistical workers.

Answering the refusal of a number of companies to sign the code, C. F. Hosford, Jr., chairman of the commission, declared that in approving and promulgating regulations and minimum prices under the act "the interests of those producers who in recognition of sound public policy are accepting the code and

Court Scoreboard on Bituminous Coal Conservation Act in 1935

Petitioner	Place and Date of Filing*	Status of Action
James Walter Carter, president, Carter Coal Co.	Washington, D. C. Aug. 31	Price provisions upheld, labor provisions invalidated, Nov. 27; permanent injunction against collection 13½-per-cent penalty tax from Carter Coal Co. granted Dec. 10; 1½-per-cent regular tax to be paid to court pending determination of appeal; U. S. Supreme Court on Dec. 20 consents to appeal direct to that body and sets hearings for March 11, 1936.
R. C. Tway, Black Star, Clover Fork, Cornett-Lewis, Creech, Crummies Creek, Gatliff, Green-Silvers, Harlan Central, Harlan Collieries, Harlan Fuel, Harlan-Wallins, High Splint, Kentucky Cardinal, Kentucky King, Mary Helen, Pioneer, P. V. & K. and Three Point coal companies (*Cross suit filed by Tway stockholder to compel compliance, Sept. 12*).	Louisville, Ky. Sept. 10	Constitutionality of act upheld, stay granted against 13½-per-cent penalty pending determination of appeal, companies directed to pay 1½-per-cent tax to court, with 1 per cent of latter amount as costs, Nov. 14; U. S. Supreme Court on Dec. 20 consents to hear appeal jointly with Carter appeal.
Alabama Fuel & Iron Co.	Birmingham, Ala. Nov. 18	
Cabin Creek Consolidated Coal & Coke Co.	Charleston, W. Va. Nov. 19	Stay against tax collection granted these and seven other companies (see below) by Judge John Paul, Lynchburg, Va., Dec. 11.
Island Creek Coal Co., Mallory Coal Co., Pond Creek Pocahontas Co.	Huntington, W. Va. Nov. 19	
Pocahontas Fuel Co., Pocahontas Corporation, Pulaski Iron Co.	Roanoke, Va. Nov. 21	
Pittsburgh Coal Co.	Pittsburgh, Pa. Nov. 21	Temporary injunction granted Dec. 20.
Union Collieries Co.	Pittsburgh, Pa. Nov. 22	
Blue Valley, Diamond, Flat Creek, Harmon Creek, Hart, Kentucky Derby, Kington Coal & Coke, Lick Creek, Low Vein; Meador, Young & Holt, Newcoal, Reinecke Coal Mining, Ruckman, Southland, Stirling, West Kentucky, Williams coal companies.	Louisville, Ky. Nov. 22	Decree requiring payment of only 1½ per cent on sales beginning Nov. 1, entered Dec. 20.
Hume-Sinclair, Huntsville-Sinclair, Reliance, Tebo, Minden, Windsor mining or coal companies.	Kansas City, Mo. Nov. 22	Act declared unconstitutional in entirety, Dec. 31.
Pittsburg & Midway Coal Mining Co., Eagle-Cherokee Coal Mining Co., Pioneer Coal & Mining Co., Kansas Fuel Co.	Kansas City, Kan.	Temporary stay against collection of 15-per-cent tax, Nov. 29.
Elk River Coal & Lumber Co., Dry Branch Coal Co., Black Band Corporation, Leevale Collieries, Inc., Dixport, Anchor and Boone County coal companies.	Charleston, W. Va. Nov. 26	See under Cabin Creek Consolidated Coal & Coke Co., etc., above.
Hanna Coal Co., Jefferson Coal Co.	Cleveland, Ohio Nov. 26	Injunction granted Dec. 17.
Delta Coal Mining Co.	East St. Louis, Ill. Nov. 27	
Seneca Coal & Coke Co., Claremore, Hickory, Gillie, Jones coal companies.	Oklahoma City, Okla. Nov. 27	Injunction against tax collection granted early in January with proviso that 1½ per cent be deposited with court.
Pike Floyd Coal Co., Kentucky Jellico Coal Co., Sudduth Fuel Co.	Louisville, Ky. Dec. 5	
Fentress Coal & Coke Co.	Nashville, Tenn.	See under same company below.
Apex Coal Co.	Fort Scott, Kan.	
Westmoreland Coal Co., Stonega Coke & Coal Co.	Philadelphia, Pa. Dec. 11	13½-per-cent tax held coercive, temporary stay granted Dec. 18; 1½-per-cent tax to be paid to court.
Little Cahaba, Stith, Blocton-Cahaba, New Castle coal companies, Sloss-Sheffield Steel & Iron Co., Woodward Iron Co.	Birmingham, Ala.	Temporary stay against 13½-per-cent tax granted Dec. 13; 1½-per-cent tax to be paid to court pending final disposition of case.

preparing to conduct their business in conformity with the act and the regulations of the commission" would be safeguarded. Carrying out the provisions of Sec. 14, the commission informed the Acting Director of Procurement, Treasury Department, on Nov. 16, that non-code mines could not share in government coal purchases. Acting on additional mandates of the act, the commission on Dec. 5 and 6 announced two investigations, one into conditions among mine workers, with the object of rehabilitating those partially or wholly displaced from employment, and the other into the effect of importation and exportation of coal on the domestic market.

Establishment of minimum price schedules got under way in December. The major development in this respect was the holding of a two-day hearing ending on Dec. 28 on the feasibility of establishing such schedules in Minimum-Price Area No. 1. The hearing was held in accordance with General Order No. 10, issued Dec. 19, and found operators divided on the question. The commission nevertheless announced that minimum price schedules for the area would be promulgated in 30 days, but later postponed the deadline. Minimum prices previously were approved for Districts 14, 16, 17 and 18 (Arkansas-Oklahoma, northern Colorado, southern Colorado, and New Mexico).

Two additional General Orders were issued in December, No. 9 designating the district boards as agents of the com-

Court Scoreboard on Bituminous Coal Conservation Act in 1935

Petitioner	Place and Date of Filing*	Status of Action
Colorado Springs Co., Corley Coal Co.	Denver, Colo.	Grave doubts as to constitutionality expressed; temporary stay granted Jan. 2.
Fentress Coal & Coke Co. (original petitioner), Charles Reece Phifer, H. C. Reece, receiver, Jackson-Laxton Co. and Davidson Coal Mining Co. and the following transferred from eastern Tennessee: Blue Diamond Coal Co., Block and Cambria coal and coke companies; Fork Mountain, High Point, Moore, New Jellico, Premier coal companies; Pruden Coal & Coke Co.; Southern Collieries, Inc.; Straight Fork, Sun, Tennessee Jellico coal companies; Windrock Coal & Coke Co.; Williams Coal Mining Co.	Nashville, Tenn.	Temporary injunction against collection of 15-per-cent tax granted Dec. 16.
Baukol-Noonan Lignite, Inc., Dakota Collieries Co., Knife River Coal Mining Co., Truax-Traer Lignite Coal Co., Zap Colliery Co., 30 or more smaller operators.	Fargo, N. D.	Temporary stay against enforcement, Dec. 28.
Firesteel-Isabel Coal Co.	Sioux Falls, S. D.	Temporary stay against enforcement, Jan. 2, 1936.
Stearns Coal & Lumber Co.	Lexington, Ky. Dec. 17	
Consolidation Coal Co., Phelps Dodge Corporation.	New York Dec. 16	Temporary injunction against 13½-per-cent tax granted Dec. 20; 1½-per-cent tax to be deposited with court.
Berwind-White Coal Mining Co., New River & Pocahontas Consolidated Coal & Coke Co., Ocean Coal Co.	Philadelphia, Pa.	Temporary injunction against tax collection granted Dec. 23;
McKell Coal & Coke Co.	Charleston, W. Va.	
Buckeye Coal Co., Republic Steel Co., Wheeling Township Coal Mining Co., Youngstown Mines Corporation.	Cleveland, Ohio Dec. 26	Temporary injunction granted Dec. 30.
Reitz Coal Co.	Pittsburgh, Pa.	
Truax-Traer Coal Co.	Chicago, Ill.	Act declared unconstitutional, temporary injunction granted Jan. 3.
Gallup-American Coal Co.	Santa Fe, N. M. Dec. 30	Stay against tax granted Jan. 15.
Loyal Hanna Coal & Coke Co.	Philadelphia, Pa. Dec. 31	
Pittsburgh Terminal Coal Corporation.	Pittsburgh, Pa.	Temporary injunction granted against enforcement of act against company and any other District 2 code member desiring to join plaintiff in action Dec. 31. (Companies joining in the action totalled 41 on Jan. 18).
Jewell Ridge Coal Corporation, Virginia Iron, Coal & Coke Co., Benedict Coal Corporation.	Roanoke, Va.	
Anthracite Coal & Briquetting Co.	Roanoke, Va.	Stay against tax collection granted early in January.
Kingston-Pocahontas Coal Co.	Southern Dist., West Virginia	
Pershing Coal Co.	Des Moines, Iowa	Hearing set for Jan. 10, 1936.
Raccoon Coal Corporation, Happy Coal Co., Happy Coal Corporation.	Eastern Dist., Kentucky	Temporary stay against prosecution Jan. 2; hearing on injunction Jan. 11, 1936.
Greenview Mining Co., Indian Creek Coal Co., Johnson Valley Coal Co.	Springfield, Ill.	Decision reserved Jan. 10.

*Suits filed in U. S. District court in each case, with exception of James Walter Carter petition, which was filed in Supreme Court for the District of Columbia.

mission in distributing data to code members and providing further that orders of the district boards shall be orders of the commission when approved by that body, and No. 11 providing that all assessments made by district boards shall become effective as and when approved by the commission; initial assessments authorized in Order No. 3 are payable by code members irrespective of commission approval. The commission also announced in December that provisions of Sec. 12 of the act, governing deliveries under contracts below the specified prices, would apply to both code and non-code members and would be enforced with all means at hand.

Companies filing acceptance of the code totaled 3,685 at the end of the year, with an annual aggregate output of 252,000,000 tons in 1934, when the total reached 359,368,000 tons.

Competitive Prospects Brighten

Prospects for eventual improvement of a substantial nature in relations with substitute fuels and sources of energy became much brighter in 1935, even though the year was marked by further gains at the expense of coal. Coal, in the opinion of authorities among both producers and consumers, is beginning to assert its economic superiority over oil and gas in the utility, industrial and railroad fields, and need fear hydro competition only when subsidized. Steady increases in stoker sales tell the story in the domestic and commercial fields.

Oil registered gains in the domestic, railroad and utility fields in 1935, and in the domestic field marked up an even better record than in the previous banner year of 1929, when 120,000 burners were sold. In the first eleven months of 1935, shipments of oil burners in the United States by 160 manufacturers accounting for approximately 88 per cent of the 1933 output value totaled 150,018, according to the Bureau of Census, an increase of 52,611 units, or 54 per cent, over the January-November, 1934, total of 97,407 burners. Shipments in the first eleven months of 1933 totaled 81,798 units. Consumption of fuel oil by burners now in service is estimated at 50,000,000 bbl. annually, equivalent to 12,500,000 tons of coal. One development in the domestic field in 1935 was the increased interest accorded it by oil companies, some of which procured and offered for sale their own burners.

Consumption of oil by railroads in road-train and yard-switching service increased to 47,472,000 bbl. (in part estimated) in 1935, an increase of 5.7 per cent over the 1934 total of 44,133,000 bbl. Coal consumption, on the other hand, was 0.6 per cent less. Utility oil consumption rose 7.7 per cent from 10,379,000 bbl. in 1934 to approximately 11,178,000 bbl. in 1935. Utility coal consumption increased only 2.5 per cent.

Natural-gas sales, on the basis of ten months' figures by the American Gas Association, increased approximately 10 per cent in 1935. The largest item was a rise of approximately 12 per cent in industrial sales. Commercial sales, a relatively small classification, increased 11 per cent, while domestic sales, second largest gas outlet, rose 6.6 per cent. Gas sales to utilities, however, declined 2.9 per cent in 1935 to approximately 124,200,000,000 cu.ft., against 127,896,000,000 cu.ft. in 1934.

In addition to gains already marked up, natural-gas distributors quietly laid plans for development of additional markets in a number of sections of the country. Michigan, in particular, was the scene of much activity and in August the Detroit City Gas Co., over strenuous protests by coal men, signed a contract with the Panhandle Eastern Pipe Line Co. for a natural-gas supply beginning July 1, 1936. A few of the projects for tapping Michigan's own gas supply appeared well on the way to fruition last year, with announcements in December that the Grand Rapids Gas Light Co. had applied for permission to build a 10¾-in. line from the Mecosta-Montcalm field, and that the Consumers Power Co., Jackson, Mich., had let a contract for a 10-in. line from the same district.

Texas-St. Louis Gas Line Fails

One major natural-gas project—the Texas-St. Louis line—failed to make the grade in 1935. Plans for the project were announced in February and provided for the establishment of a Texas Natural Gas Authority to obtain a $50,000,000 construction allotment from the PWA. A flood of protests followed immediately in which the Southern Illinois Reciprocal Trade Association, National Job Saving and Investment Protection Bureau for the Coal Industry, Coal Exchange of St. Louis, Illinois Mining Institute, Harlan County Coal Operators' Association, Stoker Manufacturers' Association, National Coal Association, the Chesapeake & Ohio, Pennsylvania and New York Central railroads and other companies, organizations and individuals participated. The proposal was left high and dry, for the present at least, when the Texas legislature adjourned in May without creating the necessary borrowing organization. PWA funds, however, were appropriated for at least one natural-gas project—to serve Pittsfield, Roodhouse, White Hall and Carrollton, Ill.

The Southern Illinois Reciprocal Trade Association actively backed a natural-gas tax measure in 1935 which, however, failed to gain the necessary number of votes in the Illinois legislature. Natural-gas taxation also came before the Tennessee legislature in 1935, but was tabled.

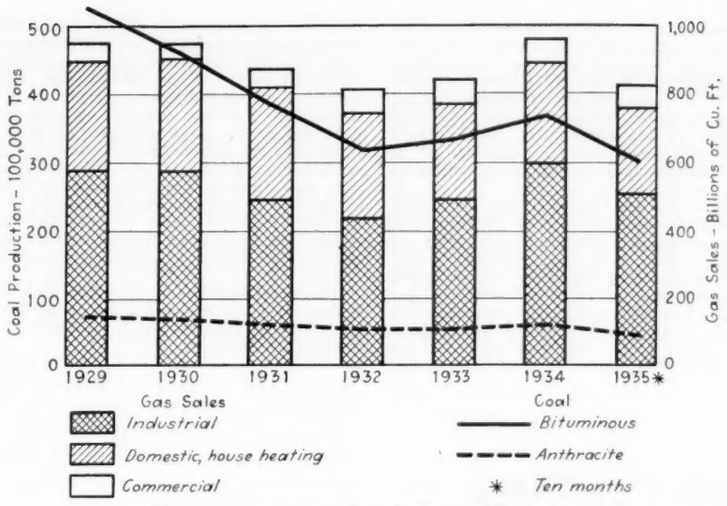
Continuance of opposition marked the industry's relations with TVA and other government-financed hydro-electric projects, actual or contemplated, in 1935. The power distribution program of TVA was successfully challenged in a preliminary test in the U. S. District Court at Birmingham, Ala., when the late Judge W. I. Grubb ruled on Feb. 22 that the authority was engaging in the sale of power not as an incident to its other purposes but as a primary objective, and therefore was committing an illegal act. Judge Grubb did not pass on the constitutionality of the act, and his decision was reversed by the New Orleans Circuit Court of Appeals on July 17. TVA opponents thereupon carried the case to the Supreme Court, where it was argued on Dec. 19.

Meanwhile, new legislation to meet the objections of Judge Grubb was offered in Congress and, after a hard fight, was passed Aug. 21. The new act specifically authorized the sale of surplus power by TVA and empowered it to lend money to States and municipalities for the purchase of distributing systems. A requirement that TVA first attempt to purchase existing distribution systems before building new ones was killed. Bond-issuing power of the authority was left at $50,000,000, however, against the $100,000,000 requested by the administration.

One government project in 1935 promised some assistance to coal. A large share of the $100,000,000 fund of the Rural Electrification Administration, it was announced, would be used for rural line extensions from existing steam plants. As outlined, the work of this government agency will be directed largely along the lines suggested late in 1934 by the National Job Saving and Investment Protection Bureau, which urged rural electrification as a more worthy objective of government spending than hydro plants.

Coal Gains Foreseen by Consumers

Factors favoring coal in the railroad, utility and industrial markets were brought to the fore at the 1935 meeting of the Coal Division of the American Institute of Mining and Metallurgical Engineers, held in St. Louis in October. Eugene McAuliffe, president, Union Pacific Coal Co., visioned a slow upturn in railroad coal consumption in response to a gradual expansion in volume and character of transportation service rendered by the carriers. Changes in the relative costs of oil and coal or legislative measures, or possibly both, will develop a national tendency to conserve oil now used for steam making to protect the requirements of internal-combustion engines and for lubricants. Diesel locomotives, said Mr. McAuliffe, have been greatly overrated as a competitor of the steam locomotive. Reduction in unit fuel consumption in railroad service undoubtedly will continue, but probably on a somewhat smaller scale.



Natural gas sales and coal output since 1929

(Gas data from American Gas Association)

Marked growth in tonnages for stationary power purposes seemed probable to E. H. Tenney, chief engineer of power plants, Union Electric Light & Power Co., as a result of increasing per capita consumption of power; limitations to the supply of oil and gas; "the apparent economic saturation, barring political subsidy, in hydro-plant construction"; flattening out in the rate of increase of efficiency in coal utilization; and "the possibilities of reducing the cost of coal burning." In the case of oil, the user must face the specter of diminishing supply reflected in the lower rate of discovery of new pools, and higher prices. Gas in the public-utility field reflects a "depression and distress-market situation," which will end with the finding of a more profitable market outlet for the wells.

Except possibly in the oil fields, stationary-gas-engine developments are practically at a standstill, Mr. Tenney stated, and no appreciable improvement in the economy of the diesel engine has been effected since the first one was built many years ago. In comparison with diesel plants, steam plants increase rapidly in efficiency with increase in size, and it is therefore "unikely that any but the smallest coal-fired steam plants should face any competition from the diesel plant." From the steam-raising standpoint, "neither oil nor gas can compete with coal on a cents per million B.t.u. basis in the greater part of this country. Their use under boilers is economically unsound except for unusual conditions, such as temporary arrangements where the steam-raising equipment is in too poor a condition to burn coal properly or where excess gas must be dumped pending more logical markets. It is also significant that, compared with modern coal-firing methods under all but very small boilers, oil and gas are inherently at a disadvantage because of the hydrogen losses in their combustion."

Concrete progress in the domestic field in 1935 is evidenced by an 80-per-cent increase in sales of residential stokers (less than 100 lb. of coal per hour) in the first eleven months of the year. Total sales in this period were 38,048 units, according to Bureau of Census figures, against 21,089 units in the same period in 1934. Apartment-house and commercial stokers (100 to 200 lb. per hour) totaled 2,881 in the period January-November, 1935, against 2,282 in the same months in 1934, reflecting gains such as those in Cincinnati, where 38 of the city's 50 bakeries changed from gas and oil to stoker-fired coal and the other twelve are expected to come into the coal ranks in the near future. Following a successful campaign in Chicago, announcement of a drive to convert restaurant ranges from gas to stoker firing was made in January.

Coal participation in the Better Homes exhibits of the Federal Housing Administration and in independent heating shows was a noteworthy development in 1935. Substantial interest was created and particularly striking results followed the conduct of heating expositions in a number of centers, particularly St. Louis and Chicago. The St. Louis show, sponsored by the St. Louis Coal Exchange and featuring automatic heat with stokers, opened in June. Average daily attendance in July was 2,000, and after a vacation in August the show was reopened for the rest of the year. Chicago stepped into the picture with a "Modern Coal Heating Exposition," which ran from Sept. 28 to Oct. 13, under the sponsorship of the Chicago Coal Merchants' Association. Participants included coal producers, sales agents, railroads, and stoker and allied equipment manufacturers. Utah operators also joined in 1935 with a coal exhibit at the State Fair, held Sept. 28-Oct. 5 in Salt Lake City. This supplemented a more extensive stoker exhibit held in connection with Federal Housing Administration activities. The possibilities of stokers for automatic heat was brought home to architects of the country in 1935 by the Iron Fireman Mfg. Co., which sponsored the 1935 *Pencil Points* architectural competition for small house design, emphasizing the use of coal heat and a basement design adapted to recreation and other family uses rather than to purely mechanical purposes.

Promising a substantial increase in ammunition for use against substitutes, the research program of Bituminous Coal Research, Inc., got under way in 1935. Major investigations started totaled three, as follows: hydrogenation for the conversion of bituminous coal dust to fuel oil, Pennsylvania State College; and characteristics of coals for underfeed stokers and chemical treatment of coals, Battelle Memorial Institute.

District sales agencies continued to play a major rôle in the promotion of coal use and in the combating of substitutes and construction of competing sources of energy by the government. One new agency, Alabama Coals, Inc., was organized in the bituminous industry in July with 81 per cent of the Alabama tonnage participating. Independent hard-coal producers accounting for sales of 11,300,000 tons in 1934 set up Independent Anthracite Coals, Inc., in January. Northern Colorado Coals, Inc., organized late in 1934, began an active advertising campaign in June to sell the economy and advantages of Colorado lignite and automatic stokers to northern and northeastern Colorado consumers.

ACI Maintains Service Line-up

Interest in the sales-agency plan in other regions in 1935 was evidenced by inquiries to Appalachian Coals, Inc., the pioneer district selling organization, from producers from Alabama to Washington, ACI reports in a special statement to *Coal Age* on its activities in the year just past. "Although deprived of its pricing functions until the United States Supreme Court rules on the Guffey Act," the agency "will maintain an organization for service along other lines. . . . Eighty-two stockholders of Appalachian Coals, Inc., representing companies which produced an aggregate of over 28,000,000 tons of Southern high-volatile coals in 1934, have contributed funds to carry on the program of the agency. That action constitutes insurance, it is stated, for the prompt establishment of the agency on its original basis if the Guffey Act is declared invalid.

"Included in the present list of stockholders of ACI are ten new companies which have subscribed to the common and preferred stock of the agency and have signed the new contract. A budget

has been established for operation of the agency under a special assessment which is a substitute for depletion of the capital stock. Therefore, if, as and when the agency is established on its original basis, there will be a very substantial percentage of the capital stock available to launch operations.

"According to the contract, which became effective Jan. 1, between ACI and its producer-stockholders, the present functions of the agency include the following:

To continue to maintain an engineering department and to render such engineering service as possible as may be helpful in increasing the demand for the contracting stockholders' coals, maintain necessary engineering records and to do any and all other engineering work possible, that may be helpful to the contracting stockholders as a whole, but within the limitations of methods and expenditures fixed by the board of directors.

To omit, for the present, the selling of coal directly or through sub-agents, but with the understanding that the work of sales promotion will be conducted under the supervision and direction of the board of directors, and to embrace among other things the following: (a) The working out of reciprocal agreements with State organizations and retail organizations and the close cooperation with those organizations in return for a preferential attitude on their part toward the coals of the contracting stockholders; (b) to attend and address meetings of retailers, to make contact with architects, heating contractors and stoker distributors, to make analyses of State and municipal regulations with reference to coal trucking, to attend sales meetings of salesmen and advertising managers for a study of market conditions and to engage in such other activities as may be possible, for the purpose of increasing the use and protecting the markets of the contracting stockholders' coals.

To continue, in part, the work of its marketing division for the purpose of analyzing and studying market conditions in consuming territories."

ANTHRACITE REGION

+ Alive to New Production Methods

NEVER has the anthracite region of Pennsylvania been more ready than today to try new methods as a means of meeting its difficult economic situation. With present low prices, competition of anthracite with substitute fuels, the public's desire to use the smaller and cheaper part of the product in place of large-size and more expensive coal, increased depth of the mines, larger inflows of water, and exhaustion of thicker seams, mechanization and other improved technique have seemed the only exits by which to escape bankruptcy; all other avenues of escape except stripping appear entirely blocked.

Mechanization of pillar work, which made such progress a few years back, seems destined soon to be overshadowed by the mechanization of virgin coal areas, which will increase as companies exhaust their thicker coal and begin to go to deeper and thinner seams. It is in these deeper seams that the larger area of lightly pitching or flat coal is available, and this is well suited to mechanization. But the efforts of the anthracite operators spread over a wide field—explosives, ventilation, drainage, electrification and marketing, with special emphasis on the first.

Longwall has a few exemplifications and, with undercutting, it is proving successful, because, generally, there are favoring conditions. In most instances, the upper beds have been mined with few, if any, pillars remaining. The roof above these beds has been broken so that the mass of rock to be controlled is merely that occupying the short distance between the bed being mined and the nearest bed above it. This breaks readily, relieving the weight. Where, on the other hand, from 300 to 2,000 ft. of rock has to be broken and controlled, the weight may override the pillar before the load has opportunity to settle on the waste rock or floor of the mine. This differentiates the conditions in bituminous coal beds of this country from those usually found in Pennsylvania anthracite beds and European deposits.

Some are planning to mine large acreages by mechanized longwall as soon as the thicker beds being worked in any large section have been mined out and, indeed, the beds are so thin that some such method seems the only way out. In some cases, jacks are being used, though some work is being attempted with wood posts.

Anthracite longwall projects, however, do not always run smoothly, for some seams have rolls and others faults which still remain to perplex management even where the problem of roof control is satisfactorily solved. At the East Bear Ridge mine, Mahanoy Plane, Pa., for example, a longwall face was opened 300 ft. long, and after six cuts, because of a small fault, the roof came down, cutting off further progress. In a short distance further the roof comes up again, but a new longwall face must now be started on the far side of the fault. Here the seam is the Lower Buck Mountain, separated from 30 to 35 ft. from the main Buck Mountain bed, which already has been excavated. The coal was conveyed along the face down a 10-deg. inclination and the face advanced along the strike. As the work in the Rabbit-Hole bed, at Salem Hill colliery of the Haddock Mining Co., in the Southern Anthracite Region, is completed, longwall has been discontinued until similar conditions make its reestablishment desirable.

More and more are pillars being drawn in regular break lines, rather than promiscuously and, when pillars are skipped, the skipping is done on the side of the pillar where the break line will be furthest from the gangway, because on that side the break line is away from the end of the pillar and leaves room for the escape of the miner and for the placing of the mine car. If the skip is put on the other side, the support of the roof at the end of the pillar must be afforded by heavy and expensive timbering, for the break line must be kept away from the pillar or there will be no chance of escape for the miner working on its end or room for placement of his mine car. However, some have not established this as a principle of operation, and costly timbering is needed, and even then accidents are likely to occur.

Several mines put in extensive conveyor systems during the year, among which may be mentioned the Monarch Anthracite Mining Co., the Sullivan Trail Coal Co., and at least two others. In one system operated by the Philadelphia & Reading Coal & Iron Co., coal is brought by several conveyors to a mother conveyor which, at a single point, delivers 1,000 tons daily.

In the past year the Sullivan Trail Coal Co. completed the reopening of the Clear Spring colliery, reestablishing operations in the Checker and Pittston beds. The shaft is being opened to the Marcy bed. Other seams available are the Red Ash and Clark. The area thus mined and to be reopened has had somewhat unequal development, so that large sections remain in which the coal is still virgin. The shaft, which was timbered, has now been concreted. Though the mine was completely flooded, it has been dewatered without any unusual difficulty, and it is now employing 300 men and producing about 1,200 tons daily in three shifts. It is using a large number of shaking conveyors in chambers 20 ft. wide with 20-ft. pillars. Three belt conveyors are employed to collect the coal from the shaking

conveyors. As the chambers are narrow, it has not been necessary to install cross conveyors. A breaker has been completed which made its trial run Jan. 5 of the present year.

In the Bernice field, the Gunton Coal Co. has been reconditioning the historic Gunton mine and now has 75 men who produce 450 tons daily, later to be increased to 700. This is a thoroughly mechanized mine. Duckbills load coal at the faces in breasts 24 ft. wide separated by 26-ft. pillars. They deliver it to seven shaker chutes, which in turn pass it to a mother belt 20 in. wide and 1,000 ft. long, not all of which is used at present. This brings the coal to the crusher, where it is joined by coal brought in trucks from a power shovel which mines the uppermost, or C, seam, which is 9 ft. thick and has about 20 ft. of cover.

This shovel produces about 200 tons of the present daily production. It both strips and loads coal and is of such size that it will continue to aid the production of the mine so long as the plant is in operation. At one time it was thought desirable to drop the stripped coal down into the mine and bring it thence by the conveyor system, but the shafts or chutes to permit of this arrangement would have to be at long intervals, and trucking to these would be necessary. Moreover, the coal would be broken. As distances to the crusher house were short and gradients favorable, it has been deemed best to truck the stripped coal all the way to the crusher house.

Crusher House on Bank

The mine will produce from two beds, A and B, both 50 to 54 in. thick, and separated from each other by a 10-ft. interval. The C seam is 95 ft. above the A bed. At the crusher house large rock is removed by hand, and then the coal is crushed to the size desired by a single double-roll crusher. This size may be stove, nut or pea. The smaller sizes are bypassed.

All the coal is assembled and dragged by a flight conveyor 450 ft. long up to the top of the breaker at the end of a gantry of that length. Here the coal is screened to stove, nut, pea, buckwheat and smaller. The four sizes first mentioned are separately cleaned in jigs and delivered direct to pockets. The sizes smaller than buckwheat are neither screened nor washed. The breaker delivers on one side to the Williamsport & North Branch Ry. and on the other to trucks. By reversing the movement of the belt and shaker conveyors, timber and other supplies can be taken into the working face. Hence no tracks have been installed.

On Oct. 1 a new hoisting shaft was put into operation at East Bear Ridge Colliery, near Mahanoy Plane, in place of the old 60-deg. Mammoth Slope. This shaft was not sunk, but raised, a distance of 250 ft., a proceeding that is estimated to have saved 40 per cent in the cost of construction. A borehole was drilled from above, which removed the gases consequent on blasting. Another newly reopened plant is the Heidelberg operation of the Heidelberg Coal Co., near Scranton. At the mine of the Alden Coal Co., Alden, Pa., a brick air shaft about 600 ft. deep has been constructed to improve ventilating conditions; a bridge has been built across the State highway to eliminate haulage hazards; and changes have been made in the breaker.

With a loan of $403,734 from the Reconstruction Finance Corporation, Indian Head Anthracite, Inc., will extend its main slope, and will drive additional tunnels to develop its first and second levels. Development also will be made in the Dundas tunnel section to permit of blending of this high-fusion-ash coal with the coal from other sections. Improvements also will be made in the breaker.

Rubber Mat on Car Bottom

Rubber mats have been fastened by the Lehigh Navigation Coal Co. to the bottoms of coal cars to prevent adherence of fine coal. When the car is inverted, that part of the rubber mat which is not held to the car floor flaps down, causing the fine coal to free itself and fall into the dump.

In that part of the Lackawanna County section of the Northern field where black blasting powder and Coalite are used, the Voortman concrete plug has made progress. It is usually placed in the borehole at a distance from the charge, so as to create what is known as a "cushioning effect." J. H. Pierce & Co. has found that, when the plug is thus used, the percentage of prepared sizes is increased 4 to 8 per cent; that is, if the percentage is, say, 60 per cent, the plug will raise the percentage to 64 or 68. Fewer holes need be drilled, and 20 to 25 per cent less powder is used. Moreover, the miners can return to the face in a much shorter time—5 as against 25 minutes—because the quantity of fumes is greatly reduced.

With fewer holes to be drilled and less fumes to be dispersed, it should be possible to reduce the quantity of compressed air used, which is often important where the pressure of the air at the face is below normal and where a large cost for more or larger compressors or pipe may be needed for operation. Some attribute the saving in powder to the effect of cushioning, but it is possible that the presence of the excess air provided in the "cushion space" in the hole causes more complete combustion, and that seems to be indicated by the decreased volume of smoke and fumes. In some cases the plug is used where the coal has been undercut, and there, less need for a concentration of the power of the explosive at the back of the hole is indicated.

The plug, which is a German innovation, is readily pushed into the hole. When the hole is tamped behind the plug, the tamped material works its way between the walls of the hole and the plug, holding the latter in place. A string passing through a hole in the plug, and knotted so as to secure it, enables the man tamping the hole to retain the plug in place while he tamps the mouth of the hole. This plug is shown on the left third of Fig. 3. The end of the plug with the small hole faces the mouth of the hole and the open end faces the charge. It is not necessary to tamp the hole from plug to coal face.

Delay Igniters for Powder

Delay shooting has many advocates in the anthracite region and much actual exemplification, but for such shooting only delay detonating fuses hitherto have been provided; but, where black blasting powder is to be fired, why use a detonator? Just a little spurt of flame is all that is needed. So argued H. J. Connolly, vice-president, Pittston Co., and accordingly experiments were made at the explosives factory to discover if a delay igniter could be devised. Fuses which get into coal unexploded are likely to cause explosions in furnaces and cook stoves and, carried to the

Fig. 1—Plant of Gunton Coal Co. during construction. Crusher house on left; breaker on right

home of the miner, may maim the younger, more inquisitive and more adventurous members of his family. As a result of the experiments, igniters were developed, some having, it is said, aluminum powder and some copper powder as the igniting substance. Unfortunately, the costs were not lowered, and the sole advantage was greater safety.

Excellent results have been obtained in rock holes by use of the Heitzman plug, which has been found by the Lehigh Navigation Coal Co. to increase by 8 in. the length of tunnel broken per shift. Too often when shots are fired in rock, the rock is not broken to the full depth of the hole and "gun holes," or unshattered sections, are left beyond the broken rock. With the Heitzman plug, which is a rubber ring with a cone-shaped interior within which a wood cone is placed and then gently driven—see right two-thirds of Fig. 3—the explosive is firmly confined and more rock is brought down. The wood plug forces the rubber against the sides of the hole.

Plugs Hole Without Tamping

Tamping of holes has been found to take up so much time that contractors often have been disposed to leave their holes untamped, but with the new plug, which is readily placed, time is saved and efficiency increased. Should the charge fail to explode, a primed cartridge can be placed against the rubber plug, confined by another plug and fired, thus detonating the original charge and avoiding the hazard and delay of drilling and charging a hole and firing this charge. The Lehigh Navigation company also has made experiments in the use of the plug in the shooting of coal, and these experiments will be continued. In shooting, the rubber is broken into shreds. Several companies, notably the Hazle Brook Coal Co. and the Philadelphia & Reading Coal & Iron Co., have been drilling long holes lengthwise their pillars and shooting the coal by sections.

At Packer No. 5 colliery of the Lehigh Valley Coal Co. the rail which is the return circuit for the electric current is connected with the compressed-air line. Some trouble was experienced from premature shots, and Andrew Koenig, division electrical engineer, ascertained that by connecting the air line with the steel sheets on which the coal ran down the breast, which pitched heavily, a considerable current could be detected. If the shooting leads touched these two conductors the shots to which they were connected would explode prematurely. In consequence he put a rubber gasket on the air line at the mouth of the breast.

At the face of the gangway the miners shoveled off steel plates, and between these and the rail a current readily could be established by placing a lead between them. The possibility

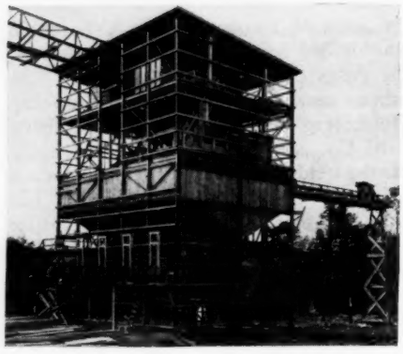


Fig. 2—Breaker, Gunton Coal Co., Bernice Pa., under construction

of such a current being set up by contact of shooting leads was eliminated by putting a wood fishplate between the last rail and the rail leading to it and, to further increase safety, a wood platform was furnished the miners in place of the steel plate.

Drainage problems are proving more and more troublesome as mines are closed down and the water of idle mines travels to operations still working. Not only does the rainfall on some areas have to be handled but, before the water leaves the coal region, it has entered more than one mine and has had to be pumped out, only to take lodgment in another. It is said that Mahanoy Creek is pumped two or three times on its way to the Susquehanna River. Consequently, it is important that the waters of this creek and others should travel unimpeded as far as possible, but such channels are nearly all badly clogged and form broad flats of fine coal and refuse.

Keep Water Out of Mines

Near Mt. Carmel, in the Southern Anthracite Region, the PWA is excavating a channel in Shamokin Creek with tools and material, including a steam shovel, provided by the Philadelphia & Reading Coal & Iron Co. A new creek bed is being cut for the Susquehanna Collieries Co., the Reading and the Lehigh Valley Coal Co. by the Rhoads Contracting Co. The excavation will total 600,000 cu.yd. The former creek bed is filled with slush from the mines of these companies, and the bottom of the creek has settled from underground mining. An electric dragline with a 70-ft. boom and a 2-yd. bucket is being used for the excavation. The PWA will pay for riprapping the bottom and sides of the new channel.

Wood flumes form so ready a firewood supply for the neighboring population that some companies have gone to steel and some are trying to dispense with flumes altogether. The Pittston Co. has found that by constructing a dam and silting the stream, the crevices will choke up and cease to pass water. A series of such dams are made in sequence until the entire length of the stream is silted.

For use underground, a bronze centrifugal pump has been devised consisting of an air motor driving a horizontal impeller, so tightly incased that the motor can be lowered into the water. A pipe is provided to carry away the water on one side of the pump, and on the other side is an air pipe to exhaust the air at the top of the water, thus avoiding the back pressure of the water head. This pump, used by the Heidelberg, Lehigh Valley and other coal companies, is simple, light, space-saving and portable. It can be operated within the clearance space of the ordinary gangway. Some of these pumps are used in working chambers; depth of submergence may be varied to suit conditions.

One of the new pumping installations is a turbine-driven pump of the Susquehanna Collieries Co. which uses less steam than the steam-driven plunger pump it replaces. This turbine drive was installed because the turbo-generators in the power plant were already loaded, and less steam is used than would have been needed had a motor-driven pump been installed. The unit is a 2,500-g.p.m., 635-ft. head, 1,170 r.p.m. centrifugal pump driven by a 550-hp., 4,108 r.p.m. condensing turbine with a 4,108/1,170 r.p.m. gear speed reducer. The company has so simplified and reduced the cost of automatic pump control that now it is found economical to install full automatic control even on the smaller units.

Tunneling becomes a growing item in the cost accounts of the collieries in the Southern Region, but everywhere there is need for more of it to reduce drainage costs. However, most companies seem unwilling to undertake such a major expenditure and one that is so long in bringing a return, large and enduring as that return is when it once begins.

Concrete Sets in High Coal

Many tunnels also are needed because the seams pitch and because the coal beds are so thick that wood timbering is quite inadequate to deal with the severe stresses. The Lehigh Navigation Coal Co. is hoping that perhaps concrete timbering will make it possible to maintain roads for a longer time in the coal beds themselves, enabling longer roads to be maintained temporarily within them than is now customary. But, even so, rock tunneling for permanent roads is inevitable in much of the Southern Anthracite Region, and the companies are learning that if contractors are to bid low they must be given adequate air pressure. Excellent car service also is necessary, even if coal production suffers from the unwonted, and unwanted, tonnage of rock. In consequence, bids are being lowered.

The Philadelphia & Reading Coal & Iron Co. is driving tunnels on a four-shift basis—a drilling-and-shooting shift, a mucking shift followed by another drilling and shooting shift and another mucking shift. By cutting the progress to 6 ft. or 6 ft. 3 in. per shift, the tunnel can be driven for months without losing a shift or failing to make the scheduled progress. By using a conveyor loader, three muckers instead of four can load the rock and do it in an hour's less time. By the use of detachable bits, it is said that the cost has been cut $1.25 to $1.50 per yard. With these bits, which a man can carry with him in number sufficient for a shift, the cost and delay due to the transportation of long drill steels is saved.

Where difficulty has been found in getting air in sufficient quantity into certain breast faces, the Reading has introduced blowers producing 20,000 cu.ft. of air per minute. These are driven by air motors and, as one fan serves for several faces and delivers the air at a distance, and as the motor develops no sparks, the method is free of several of the disadvantages which ordinary auxiliary fan ventilation involves. These fans are put in the airways, that part of the airway not occupied by the fan being shut off. Such fans are more economical than compressed-air injectors. When shut down they can be started without risk of explosion.

Preparation Keeps Pace

Preparation activities centered largely on the steam sizes, where efforts were devoted both to further reduction of ash and greater precision in sizing. (Construction in 1935 is summarized in the tabulation on p. 68.) New breakers were built by the following in 1935: Gunton Coal Co., Bernice, Simplex jig washing equipment; Sullivan Trail Coal Co., 1,200 tons per day, one 12-ft. Menzies cone separator for egg to pea, one 10-ft. cone separator for buckwheat, rice and barley; Wolfe Collieries Co., 1,200 tons per day, Simplex jigs for prepared sizes and Hydrotator for fine sizes, including precleaner for primary screening, crushing and preliminary preparation.

The Sandy Run Miners' & Producers' Co. remodeled its breaker in 1935, installing Simplex jigs for egg, stove, nut and pea, and Hydrotator equipment for Nos. 1, 2 and 3 buckwheat. Nine 8-ft. cone separators were installed in the Bliss breaker of the Glen Alden Coal Co. to clean part of the stove and all of the nut to barley sizes, inclusive, replacing jigs. Another major remodeling project was the installation of one 18-ft. cone, egg to pea, and two 10x10-ft. square-topped cones, buckwheat to barley, in the Tamaqua breaker of the Lehigh Navigation Coal Co.

Included in individual fine-coal installations in 1935 was a washing plant for $\frac{3}{16}$x$\frac{3}{64}$-in. material at the St. Clair Coal Co. breaker, including four Deister-Overstrom Diagonal-Deck coal-washing tables, each with a rated output of 8 tons of cleaned-coal per hour. Minus $\frac{3}{16}$-in. anthracite silt is handled in another table installation by the American Briquetting Co. The Pine Hill Coal Co. was another company to install silt-washing equipment, in this case a Hydrotator unit.

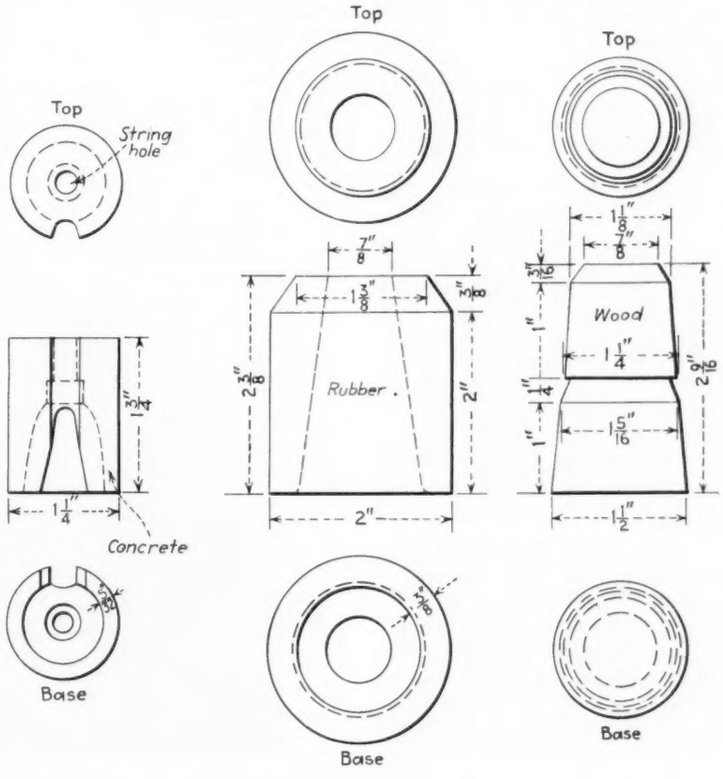
To provide coal in readily retailable condition and of specified weight, the Lehigh Navigation Coal Co. has a plant in which 300 tons of coal can be placed in paper bags in eight hours. The product is known as "MinePakt Coal." Formerly bags holding as little as 12½ lb. each were used, but the present sizes are 16-, 18-, 20-, 25- and 50-lb. bags.

The coal is placed in hopper cars at the colliery and inspected. If found up to standard, it is shipped to the bagging house, where it is dropped out of the hopper and runs to the air dryer, where any moisture it may contain is removed by heated air. Thence it is conveyed to a storage bin above the bagging machines. The lower part of the bin has chutes equipped with screens which remove the fines. From these chutes the coal goes to the various bagging machines, where the coal is automatically weighed, bagged and tied. This done, the coal and bag passes to the conveying belt which takes it to box cars, four bags being loaded at one time. At intervals a bag is taken in the course of travel and weighed to check the automatic weighing. The bags are laid flat in the car by hand.

Each bag is printed with the size and weight of the coal, the dealer's name and telephone number. Most of the bags have double walls, and all are tied with wire. The 50-lb. bags are filled in two sections, 25 lb. at a time. The sizes bagged are chestnut and pea. In passing to the storage bin, chestnut coal is resized on a sizing shaker, and the undersize passes to the boiler room, where it is used to raise steam for the operation of the plant. Pea coal screened out of the stove size, when that size is being bagged, is loaded into bags to fill pea-coal orders.

For several years the Lehigh Navigation Coal Co. has been looking for an outlet for the hundreds of thousands of tons of breaker waste which is produced annually as an incident to pitch mining. In spite of the low fuel value of this material, it has been found possible to burn it on a traveling grate using forced draft. The resultant ash is hard clinker which can be used in the making of a concrete which is about a third lighter than the same product made with sand or gravel. The concrete is similar to that used extensively in the West, and during the World War for making the hulls of ships. Thus far no plant or plants for the production of this aggregate have been erected.

Fig. 3—Left, concrete blasting plug; middle, rubber blasting plug; right, wood plug by which rubber plug is secured. Base of concrete plug faces charge; that of rubber plug faces mouth of hole



STRIPPING IN 1935

+ Marked by Use of Larger Equipment

FURTHER gains were marked up for both bituminous and anthracite stripping in 1935 in a year featured in bituminous fields by the installation of either larger excavating units or dippers and the extension of trailer haulage and in anthracite by a still greater reliance on this form of mining for the recovery of either virgin or partly mined coal near the surface. An increase in size of equipment used characterized progress in the anthracite region also.

Developments in bituminous strip-mining areas were topped off by the installation of shovels with 30- and 32-cu.yd. dippers at new operations in Indiana and Illinois. Less spectacular but equally important in the aggregate were developments at going operations, principally in the adoption of larger dippers or the installation of automotive transport equipment. The Pyramid Coal Corporation, for example, replaced a 12-cu.yd. dipper on its Bucyrus-Erie 750B stripping unit at Pinckneyville with an 18-cu.yd. dipper of approximately the same weight. At the neighboring operation of the Coal Stripping Corporation, size of trailer haulage equipment was increased by the installation of three 25-ton Austin-Western trail cars.

At the Sherwood-Templeton operations in Indiana, dipper size was increased on one shovel and four trailer units, each consisting of a White tractor and a 15-ton Sanford-Day bottom-dumping trailer, were put in service at the Allendale mine of the Central Indiana Coal Co. Farther south in the same State, the Enos Coal Mining Co. changed the 18-cu.yd. dipper on a 750B stripping unit to a 22-cu.yd. unit. In the process, a weight saving of 10,000 lb. was obtained through redesign and the use of a welded instead of a cast construction.

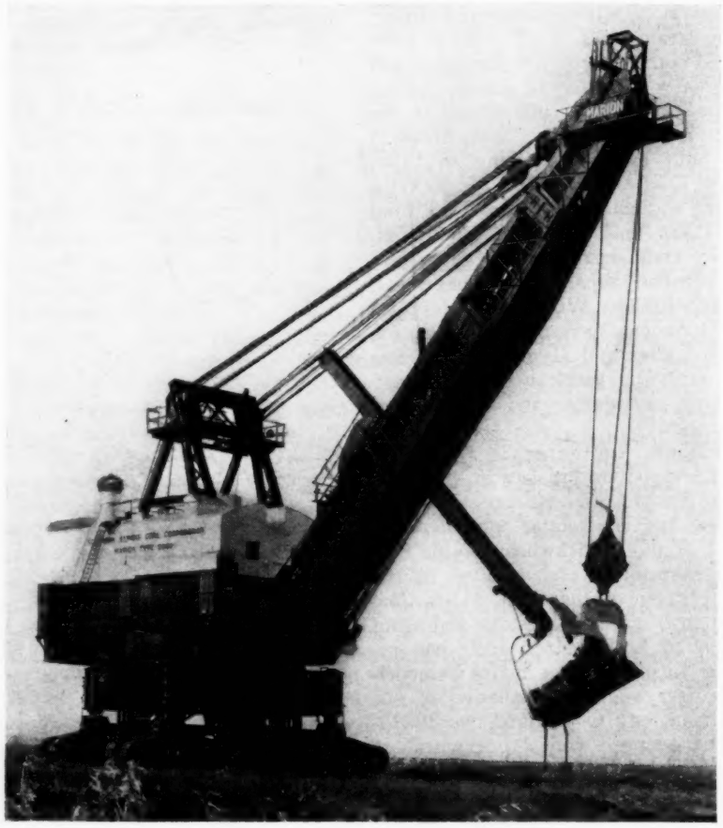
Enos also installed eight trailer units, each consisting of an Auto-Car tractor and a 20-ton Austin-Western trail car. These units displaced six steam locomotives. Transportation, however, takes place in two stages, the trailers hauling to a dumping station at the mouth of the pit, where the coal is discharged into standard-gage railroad cars for movement to the preparation plant. Average round-trip haul of the trailers is approximately 1¼ miles, and the units in service account for approximately 4,300 tons in seven hours.

Still farther south in Indiana, the Sunlight Coal Co. transferred its stripping equipment to a new pit, built a wet-preparation plant and installed Mack "AC" trucks with a maximum capacity of 15 tons for transporting coal from the pit to the preparation plant.

Along with the use of welded alloy-steel—the basis of the 30-cu.yd. Indiana dipper—as a means of saving weight and thus permitting the replacement of smaller with larger dippers is the use of aluminum alloys, made possible by the efforts of Charles Martin Hall, a 22-year-old graduate of Oberlin College, who, in January 50 years ago, worked out a process for the commercial production of aluminum.

Aluminum construction features the 32-cu.yd. Illinois dipper, which is similar to a number of 16- and 17-cu.yd. dippers in service for some time. Gross weight of a 16-cu.yd. dipper fully loaded is approximately 80,000 lb., or slightly less than the average 12-cu.yd. dipper of conventional construction. Bail and pitch braces in aluminum dippers are aluminum-alloy forgings, except in the case of bails of the riveted-box-girder type, in which plates and angles are employed. Dipper body consists of one or two thicknesses of plate. Aluminum-alloy plates also comprise the door, while door hinges, adjusting casting, latch-bar guides, backs, back spacers and back

32 cu.yd. stripper of the Northern Illinois Coal Corporation



pads are aluminum castings. Parts subject to constant abrasion, such as teeth and lips, are made of manganese steel. On large dippers, bodies and door plates are protected by thin-steel plates. In other designs, such as the 15-cu.yd. dipper installed in place of a 12-cu.yd. unit by the Commercial Fuel Co., aluminum-alloy plates and casting for major parts are limited to the back plate and back braces connecting top and bottom castings, manganese and high-tensile rolled steel being used elsewhere.

The 32-cu.yd. shovel (Marion 5560) went into service at the Wilmington (Ill.) stripping operation of the Northern Illinois Coal Corporation and is employed in uncovering the Wilmington Third Vein averaging 3 to 3½ ft. in thickness. Overburden thickness ranges from 20 to 55 ft., averaging 30 to 45 ft., and the coal is overlaid by a shale graduating in some places into sandstone. Above the shale is a stratum of clay, overlaid by surface drift. The shovel is equipped with a 104-ft. boom, a dipper stick over 65 ft. long, and can dump at a height of 70 ft. above the working level. It is powered by motors and generators with an equivalent rating of 3,500 hp. Motors and electrical control were supplied by the General Electric Co.

Stripping at the new Bobolink mine of the Binkley Mining Co., Seeleyville, Ind., is done by a Bucyrus-Erie 950B electric shovel with a 105-ft. boom, 64-ft. dipper stick and 30-cu.yd. welded alloy-steel dipper. Dumping range is 106 ft.; dumping height, 70 ft. Instead of the conventional box-girder boom, the Bobolink shovel is fitted with an open-frame boom somewhat resembling the dragline type. A cylindrical dipper stick and rope crowd are other features. The dipper is counterweighted. Thirty General Electric motors with an aggregate rating of 2,500 hp. operate the unit. Coal is transported from the pit to the tipple in 25-ton Austin-Western trail cars attached to six-wheeled White tractors with four-rear-wheel drive.

In the Pennsylvania anthracite region, strippings in a few instances have been provided with preliminary preparation plants. Such preliminary cleaning eliminates delivering material containing a large quantity of rock, clay and other refuse to the breaker, relieving the breaker of this excessive burden and saving the transportation of such waste. Use of draglines at times has had some part in this innovation, for the dragline is less selective in loading than the shovel. Just how far this preliminary preparation will go, as larger operations are developed, remains yet to be determined. But, since strippings usually are located at points well up on the hills, opportunity for the disposal of waste material is often more available there than around the shaft, which today is usually sunk in a valley. Moreover, around many of the shafts,

Close-up of the 30-cu.yd. Bobolink stripping unit toying with one of the 25-ton trailer units

ground for dumping already is utilized to the utmost for other purposes.

Usually the coal separation at the stripping consists mainly of the removal of large refuse on picking platforms, and the burden of cleaning rests on the stripping contractor, if such there be, or on the company forces, if stripping is thus controlled. Hence, the stripper can choose his method with a view to producing a product of acceptable quality at least expense to himself. If to load a little dirtier coal and clean it at the local preparation plant will result in major economies that will far more than repay the cleaning, that method will be favored, but, on the other hand, if excavating with an eye to more careful selection will reduce cost by saving cleaning expense and refuse disposal, that method will be followed. However, none of the cleaning plants thus far constructed at strippings will remove the finer waste material that excavation by non-selective methods introduces. Some contend that where dividers occur in seams, such as the Mammoth, they often should be loaded with the coal and separated at the breaker. However, the preliminary cleaning plant offers another solution; the contractor or company can choose whether to select the material to be loaded, or to load and haul all or a large part of it indiscriminately and clean out the larger refuse in a stripping preparation plant provided for that purpose. Such cleaning, though simple and inexpensive, will entail a cost that is best suited to a large tonnage and one having a year or years of expected life.

Presence of coal in areas to be stripped is sometimes proved by drilling, though not as frequently as in bituminous practice. As the coal occasionally is faulted, it would be better if the practice were more usual in the anthracite region. Drilling being expensive and the strippable deposits being shallow, geophysical tests recently have been made by Lehigh University experts to determine the presence or absence of coal. Tests with explosives—seismic methods—proving unsuccessful, electrical methods were adopted with success. Evidently the presence of coal can thus be proved and, where it is found, the ground profitably can be drilled to determine the thickness of the seam, thus avoiding the drilling of areas which are barren or have already been mined by underground operations and also eliminating the possibility of covering strippable coal with waste from the stripper. So customary was it in earlier years to mark as having been mined coal that had outcroppy or other bad roof, had dividers or was cut off by a gangway or chamber fall, that the old maps are unreliable. It is desirable, therefore, to

avoid drilling at random and to restrict drilling to areas where geophysical methods have shown that coal exists.

A 10-cu. yd. and a 3-cu. yd. walking dragline have been working since 1934 at the Knickerbocker strippings of the Reading and the Park stripping of the Lehigh Valley, removing the coal from several seams which pitch at an angle of about 45 deg. The larger unit has a 140-ft. boom and the smaller a boom 80 ft. long. The loose material with an initial lift of rock is removed first, and what outcrop coal is uncovered thereby is loaded out. Later the rest of the rock to the limit of the proposed excavation is removed, and this is followed by the removal of the rest of the coal by a 2½-cu. yd. dragline or by smaller convertible units that may be used either as shovels or dragline excavators.

A large stripping in the Mammoth and Buck Mountain beds has been opened by Hill & Suender near Bast Colliery, Ashland, Pa., for the Reading company, using a 4-cu. yd. and 2½-cu. yd. electric shovel, a 4-cu. yd diesel dragline, a 1¾-cu. yd. gasoline shovel and fifteen 8-cu. yd. trucks. This stripping, which has been in operation about three months, will remove in all 2,500,000 cu. yd. At the Mahanoy stripping the Rhoads Contracting Co. has installed a 10-cu. yd dragline with 150-ft. boom. A 10-cu. yd. high-tensile steel truck is being tested at this stripping.

BITUMINOUS MINES

+ Expand Mechanization Still Further in 1935

SPURRED ON by the necessity for keeping prices down to reasonably low levels to preserve markets and at the same time compensate for higher wage rates and shorter hours, bituminous operators of the country put even greater pressure behind improvements in underground equipment and methods in 1935. Mechanization of loading, as in past years, held the spotlight, but all activities and equipment involved in getting coal to daylight felt in some degree the impetus of change.

The pace at which mines are adopting the principle of mechanization is evidenced by the fact that 35 companies, which does not include a number for which no data were available, bought 81 mobile loaders in 1935. Operations of these companies were distributed among ten States. The interest in conveyors evident in 1934 was carried over in intensified form into 1935 with a substantial number of installations as concrete evidence of the increasing regard in which they are held by operators with coal too thin for economical working by other methods.

During 1935, the mobile loader moved into territory hitherto closed to it because of height limitations. Reductions in the vertical dimensions of new models offered during the year opened up new possibilities for mechanization of thinner seams, which was immediately reflected in the installation of machines in such coal by a number of companies throughout the country. At the other end of the scale, new high-tonnage machines pushed still higher the output per machine-shift. In one instance, an average of 500 tons per machine per shift is reported. Crews in this case comprise fourteen men, and two locomotives are employed for car-shifting. Coal thickness is 7½ ft. Under less favorable conditions, three loaders at the New Hope mine of the Linton-Summit Coal Co., Linton, Ind., were averaging 1,700 tons in seven hours at the end of 1935, or 565 tons per machine with nineteen-man crews and two serving locomotives per machine.

Mobile-loader activity in 1935 was characterized by a substantial increase in interest in Eastern and Southern fields, where, as compared with the Middle West and the Rocky Mountain fields, installations have been scattered in the past. In 1935, however, Alabama, already a substantial user of conveying equipment, offered a number of recruits to the mobile-loader column, among which was the DeBardeleben Coal Corporation with a number of Joy units. Kentucky reported at least one mobile-loader operation. Southern West Virginia installations included, among others, the Nellis Coal Corporation, one Jeffrey 44-D loader, and the Crystal Block Coal & Coke Co., Logan County, two loaders of the same type. The past year also saw the start of a mechanization program at mines of the Island Creek Coal Co.

Northern West Virginia was represented by at least two loader installations in 1935, and central and western Pennsylvania added to equipment in service—including a Joy 7BU machine for slate and rock put in service by the Vesta Coal Co. In Ohio, the Hanna Coal Co., operator of the widely known Fairpoint No. 9 mechanical mine, laid plans for mechanizing its Willow Grove No. 10 operation, which, it is expected, will be characterized by even further concentration of operations than at Fairpoint. While some sizable installations characterized developments in the above fields in 1935, still more were in the development stage, presaging a major increase in activity in 1936.

As the principal users of mobile loaders in past years, Illinois and Indiana operators maintained their leadership in 1935. Additional units were added by a number of companies already committed to the use of loaders and a number of mines were transformed from hand-loading to mechanized operations during the year. One of the major change-overs in Illinois was the Zeigler No. 2 mine of the Bell & Zoller Coal & Mining Co., where a mechanization program involving the installation of Joy 11BU loaders will be completed early in 1936. Last year also marked the 100-per-cent adoption of Cardox and Airdox at both Zeigler mines. At both No. 1, previously mechanized, and No. 2, one Airdox unit is employed in development work. The rest of the coal at both mines is now broken down with Cardox. Installation of loaders and Cardox-Airdox at No. 2 also was accompanied by the adoption of a steel car similar to the type previously used but with a capacity of 155 cu.ft., against the old figure of 125 cu.ft. Design features include copper-bearing steel and roller bearings.

The Franklin County Coal Corporation completed mechanization of its Royalton No. 7 mine and two-thirds mechanized its Energy No. 5 mine. The program involved the purchase of eight Joy 7BU loaders and two Goodman track-mounted loaders. Royalton No. 7 is now equipped with five 7BU machines (one spare) and two Goodman loaders; Energy No. 5 with four 5BU machines (one spare), transferred from Royalton, and three 7BU loaders. Additional Illinois operations adding to mobile-loader equipment included: Indiada & Illinois Coal Corporation, Nokomis; Perry Coal Co., O'Fallon, Joy 11BU loader and 100 all-steel 3½-ton cars with cast-steel underframes; Rex Coal Co., Eldorado, two Joy and one

Goodman loaders; Sahara Coal Co.; and F. H. Seymour, Herrin, two Jeffrey 44-D loaders. Thirty-eight pit-car loaders were replaced by three Goodman track-mounted machines at the No. 8 mine of the Old Ben Coal Corporation, West Frankfort.

Indiana operators either installing or expanding mobile-loader equipment in 1935 included: Big Vein Coal Co., Binkley Mining Co., Black Hawk Coal Corporation, Bonnie Brook Mines, Inc.; Glendora Coal Co., Knox Consolidated Coal Corporation, Joy 11BU loader; Princeton Mining Co., one 10BU and one 11BU Joy loaders; Snow Hill Coal Corporation; Standard Coal Co., two Joy 5BU loaders; Templeton Coal Co.; and the Universal Coal Corporation. Mechanization of loading underground was a major element in the construction program at Snow Hill's Talleydale mine, in the Clinton field. In addition to a new 350-ft. shaft to tap the Indiana No. 3 seam on the property and a mechanical preparation plant with a capacity of 500 tons per hour, the company installed four Goodman and two Jeffrey 44-D track-mounted loaders. The management also followed out the accepted principle that efficiency is promoted by use of a big car and installed all-steel solid-end cars with a capacity of 6 tons.

Developments at the Glendora and Templeton operations epitomized the change from transitional to high-tonnage equipment which has characterized developments at a number of operations in the last several years. The final step was taken in 1935, when six Goodman track-mounted machines went in to supplement Jeffrey and Goodman equipment already in service and eliminate the last of the pit-car loaders, except for a few units used from time to time in entry-driving. The loader installation was accompanied by the purchase of additional Goodman track-mounted cutting machines, reflecting the tendency among a number of operators to supplement installations of track-mounted loaders with the track-type cutter, on the theory that track-mounted loaders can load easier from a curved face than from a straight face.

Two Locomotives Serve Loaders

With the advent of higher-capacity loading machines, the practice of using two serving locomotives was extended still further. In this connection, the experience of one company employing two locomotives per machine and changing in crosscuts indicated that changing tracks could be allowed to fall as much as 150 ft. behind the face without appreciably affecting machine output, as the longer time for locomotive travel normally would be occupied in moving the machine, etc. Increased stress was laid on tightening up the whole underground cycle at a number of mines, supplemented by improvements in physical conditions and equipment to reduce interruptions and speed movement. In many cases, although no major changes in equipment or methods were involved, these measures were reflected in a substantial increase in machine output. At the mines of the Knox Consolidated Coal Corporation, for example, average output per loader per shift in the first six months of 1935 was 403 tons at No. 2 mine and 381 tons at No. 1. This compares with averages of 360 tons at No. 2 and 330 tons at No. 1 in the latter part of 1934.

The year 1935 also brought into existence at least one operation built around mobile machines for loading and conveyors for transporting the coal to the preparation plant on the surface. At this operation, in eastern Kentucky, in coal approximately 42 in. thick, two low-type loaders will place the coal on four chain-and-flight conveyors, which in turn will be served by a series of belt conveyors, one of the extensible type, extending to the surface.

Conveyor Installations Increase

Conveyor progress was most notable in Eastern, Southern and Rocky Mountain fields in 1935, with the East and South concentrating largely on chain-and-flight types, as, for example, at the Red Parrot Coal Co. mine in southern West Virginia (three Jeffrey 61-AM units), one of a number of operations in the Eastern and Southern States to adopt flight-type conveying equipment. Eastern developments also were featured by the adoption of the principle of mother conveyors of either the flight type, as at the Jewell Ridge Coal Corporation mine (*Coal Age*, May, 1935, p. 207), or of the chain-and-flight type, adopted by the Pemberton Coal & Coke Co. for its Affinity operation last year. Two units, each consisting of six room conveyors and a 400-ft. mother conveyor, were installed at Affinity in 1935.

Shaker conveyors, in many cases with duckbills, were the favored type of equipment in Rocky Mountain fields, where this equipment already has won a permanent place in several districts, notably Wyoming. Developments in northern Colorado were marked by a sharp increase in interest in duckbill-equipped shaker conveyors for thin-coal areas, and such equipment was installed for a material percentage of the Monarch mine output by the National Fuel Co. Utah operators with thin coal also explored the possibilities of shaker conveyors. Shooting on the shift with Cardox and hand loading featured a number of conveyor installations in that State. One mine was reported to be operating on a longwall plan with conveying equipment. In New Mexico, the Phelps Dodge Corporation installed a Goodman 260-A loader late in the year. Goodman entry-type scraper loaders account for approximately 38 per cent of the output of this operation, and an outstanding development in 1935 was the recovery of barrier pillars with this equipment.

Thinner kerfs and ability to cut at any height or at any position characterize the modern coal cutters which operate from the track. Evidence seems to be accumulating that the machines which cut while on the floor of the mine soon will be entirely superseded by track-mounted equipment except in untracked rooms and in longwall. Machines with double cutter bars which cut on both sides of a parting have had some application. More and more companies are tipping their bits with alloys which have greater hardness and longer life than ordinary tool steel. Preliminary tests at an Illinois mine indicate a four-fold increase in tonnage per bit with hardsurfacing.

Many bituminous coal companies in 1935 concluded, as indeed have many before them, that their mine transportation was so closely approximating a railroad problem that the regrading of the main haulageway and the laying of heavier and better equipped track was an improvement that no longer could be delayed. The sooner installed, the longer the benefits would be enjoyed. In No. 10 mine of the Hanna Coal Co., 3,400 ft. of track was laid, using 60-lb. rail and 4x6-in. treated ties spaced at 18-in. centers with four steel ties to each 30 ft. of track. Ballasted with 1¼x2-in. slag and with Thermit-weld rail joints, the track is so sturdy and smooth that pounding in passing from rail to rail is entirely eliminated; splice bars and rail bonds no longer are needed.

Heavy Steel for Hard Work

At its Red Dragon mine, the Glogora Coal Co. graded its main entry and retracked it with 60-lb. steel, and the same proceeding is scheduled for Glogora No. 1 mine, in Kentucky. Similar rebuilding of haulage roads with 60-lb. rail was accomplished at two of the mines of the Youghiogheny & Ohio Coal Co. during 1935. Rails were laid on 6x8-in.x5½-ft. treated ties and the track was ballasted with slag. The Dawson Daylight Coal Co. also reduced its gradients, realigned its road, easing its sharp curves especially on entry turnouts.

A haulage road three miles long from face to tipple made the Scandia Coal Co., of Iowa, duly cognizant of the severity of the transportation problem. One track now is laid in the main heading and one in the back heading. The main haulageway has been carefully surveyed and suitable gradients have been determined in the railroad manner, swags being removed by brushing top in low places and lifting bottom in high places. Sixty-pound rails have been laid on creosoted white-oak ties duly lined and leveled to the predetermined gradients. By double track, improved, gradients, more perfect alignment and use of roller bearings, transportation

costs have been materially reduced.

One large company in the Pocahontas field introduced a number of steel ties so crimped at the ends that they would take firm hold on the bottom, preventing the track from shifting and eliminating the annoyance and damage caused by the cables of gathering locomotives catching under the ends of ties. It has found that steel ties, though more expensive in first cost, speed transportation and eliminate costly delays.

Many companies are increasing car size. At one mine of the Panther Creek Mines, Inc., cars of 3,000 lb. capacity were replaced by other units of 4,000 lb. capacity; at another mine, a 2,700-lb. capacity car has been superseded by one holding 3,400 lb. These cars are semi-steel and have roller bearings. The Dawson Daylight Coal Co. has installed the new all-steel rotary-dump type cars. Over-all length is 11 ft. 5½ in.; over-all width, 6 ft.; height over rail, 29½ in.; gage, 42 in.; wheelbase, 42 in.; wheels, 14-in. diameter; capacity, 100 cu.ft., and net capacity by weight, 3.25 tons. Peabody Coal Co., at Mine 24, Westville, Ill., has salvaged its old cars, which were too small, and replaced them by 550 cars of 3½-ton capacity.

At Castle Gate mine of the Utah Fuel Co., permissible storage-battery locomotives have replaced trolley and cable-reel locomotives and animal haulage, thus matching the permissible equipment at the coal face. Trolley locomotives will be used only in the main intake haulageways. Phelps Dodge Corporation is using combination storage-battery-and-trolley locomotives behind its Goodman loaders, and last year added an additional unit.

Locomotives Can Stoop

From all quarters come reports of new haulage equipment for main-line service. Thus the Colorado Fuel & Iron Co., at its Crested Butte mine, installed underground trolley locomotives in place of its rope-haulage system. One large company in the Pocahontas region has introduced a number of low-type Westinghouse 15-ton haulage locomotives, which are only 32-in. high but 15¼ ft. long and equipped with two 110-ton motors. This company finds that it can afford to keep sidetracks closer to the face than before, despite low top.

Double-drum cable reels without differential for equalizing tension on both cables have made their appearance. Trolley and ground cables being separated in such units, short-circuits should be eliminated. Plane operation has always been a source of anxiety culminating in grief. To assure safety, the Blue Diamond Coal Co. has provided electric control of a large coal monitor and its hoisting drums. At the mines of the Dawson Daylight Coal Co., a Roberts & Schaefer rotary dump has been installed about 450 ft. inside the mine portal, and to speed up operations and promote safety the Nellis Coal Corporation has introduced three American Mine Door automatic switch throwers.

In Utah, wherever the seams are thin and shaking conveyors are used, it is customary to shoot the coal with Cardox. During 1935 all coal produced by the Harvey Coal Corporation, in Kentucky, was shot with Cardox with an increase in prepared sizes and decreased degradation in shipping and in handling at destination.

Firing Tube for Powder

At the Lundale (W. Va.) mine of the Logan County Coal Corporation, the coal face mined for loading into conveyors is being shot with powder by the aid of a shooting barrel or "Blon firing tube." The barrel consists of a 1¼-in. extra heavy pipe, 7 ft. long, tipped with a copper plug at the powder end. This plug has at its center a funnel-shaped hole reaching back to the walls of the firing tube, so that the squib when it travels along the barrel is directed toward the end of the hole, where it ignites the powder. When a hole is drilled and powder has been inserted, the blasting barrel is pushed in until it reaches the powder. Then a wedge, which surrounds the barrel at the outer end near the coal face, is driven to refusal so as to hold the tube in place despite the outward force of the powder when exploded. In Maryland an innovation is the employment of shot-firers who load and shoot their own holes.

Mine ventilation has aroused continued interest. The Rochester & Pittsburgh Coal Co. recently put in two ventilation shafts so as to shorten the travel of its air at one of its large mines, and the Youghiogheny & Ohio Coal Co. just completed an air shaft at one of its Ohio mines that will greatly improve its ventilation. Mine "B" Coal Co. sunk a new shaft in 1934 which reduced air travel two miles, and in 1935 rejoiced that it had more and better air and decreased the power consumption of its fan to boot. At the Oakwood mine of the New River Co. a 585-ft. air shaft is being sunk which is already half way down.

Glogora Coal Co. installed two new Charavay mine fans—a type having propeller blades—an 8-ft. fan installed in a new steel and concrete fan house at Red Dragon, Va., and a 6-ft. fan at Glo, Ky. Aerovanes and centrifugals in number have been installed. In the past year the Vesta Coal Co. relined the Richey shaft at No. 4 mine and installed a fan of 200,000-cu.ft. capacity. "Substantial increase of efficiency" resulted when the Old Ben Coal Corporation changed a fan wheel and installed a V-belt drive using the old shaft and bearings. At the Exeter mine of the Kingston-Pocahontas Coal Co. a Jeffrey multivane fan with a rating of 400,000 cu.ft. per minute at 4-in. water gage and driven by a 500-hp. motor will take over the ventilation of half the mine and will exhaust through the pipe-and-cable compartment.

Replacement of pumping by gravity drainage was the goal of several companies in 1935. With the volume of water to be pumped dependent not on tonnage mined but on time elapsed, irregular operation has caused the costs of pumping to mount. One company in southern West Virginia, having this in mind and desiring to find work for its idle men, has commenced, and nearly completed, a project which will give it waterways 18 miles long and provide gravity drainage over the entire distance. Though the Johnstown Coal & Coke Co. has had to make changes in its pumping equipment at its Portage operations, in West Virginia, its subsidiary, the Greenbrier Smokeless Coal Co., is driving a tunnel for gravity drainage.

Better Light, Clean Coal

Illumination has been emphasized as a means of improving the quality of the coal when hand-picked at the face. Recent improvements in the electric cap lamp are causing many companies to take advantage of the possibility of improving face ventilation, which reaches an extremely low ebb when coal is shot during working hours. During the year the Bureau of Mines developed an indicating device, for use in the flame safety lamp, which can be inserted in Koehler and Wolf round-wick safety lamps.

Treated timber extended its field during the past year. Berwind-White Coal Mining Co. continued to use treated timber along its main haulageways, not only for roof support but for ties. Much such timber is used in all airways and waterways which promise long life. This timber is purchased by the company from commercial producers and is not treated in a company plant. Creosoted timber is used where there is little fire hazard. Elsewhere this company uses timber which has been treated with salts. In Maryland, where steel rails seemed to make progress as roof supports, the use of rails for that purpose has been entirely discontinued.

A few companies are using or preparing to use high-pressure rock-dusting equipment for the treatment of return airways, where all the working-face dust and all the gas is found and which need treatment even more than intakes. The Hillman Coal & Coke Co. has furnished each stopping with a 6-in. pipe having a cast-iron plug. On removing this plug, 300 ft. of hose is passed through it and carried into and along the return airway so that the entire heading to the next crosscut can be adequately rock-dusted. Another company with a high-pressure rock-dusting project is the Allegheny-Pittsburgh Coal Co.

BETTER MARKETS

+ Planned by Extended Research

COAL RESEARCH in the past year took a definite step forward when Bituminous Coal Research, Inc., the agency promoted by the National Coal Association, decided what investigations it intended to make and designated the laboratories which would undertake them. The names of these undertakings can be found under their appropriate headings in the general tabulation. Like the Anthracite Institute, the bituminous organization proposed, through Battelle Memorial Institute, to determine the conditions under which domestic stokers will best operate and also to study the field of domestic heating.

All the many questions of the effect on coal of treatment to allay dust, to change ash-fusion characteristics, to prevent smoke and, it may be supposed, to prevent freezing are to be broached and, if possible, answered. Pennsylvania State College will study hydrogenation of coal for the same organization. The staff of the college prepared an outline or plan for future research incorporating the ideas of over 100 specialists. A fellowship in fuel technology also has been established at Penn State for fundamental research in coal and three other fellowships are pending.

Corporations Donate Funds

When the most recent Pennsylvania Legislature appropriated $150,000 for research, new teaching equipment and extension instruction in the School of Mineral Industries at Penn State, the Governor cut the appropriation to a single item of $50,000 for the biennium 1935-1937 with the understanding that the State should match dollar for dollar all contributions received from the industry. On Dec. 27 of last year contributions and grants-in-aid amounting to $21,365.45 had been made by industries matching the State funds, and items totaling about $9,000 were under consideration.

Comparisons between the numbers of projects listed in 1934 and 1935 (168 as against 254) would show a large increase, but that is due to a somewhat more liberal admission of projects to the tabulation, some of which are frankly studies in oils not derived from coal and others are studies of somewhat distant byproducts of coal, such as only chemists would be likely to recognize as stemming back, in part at least, to that parent substance. All the oils can be or may be obtained from coal and are therefore of interest to the coal technologist. As to the other items, coal may be compared to a neglectful parent who is content to let his children care for themselves or become *protégés* of anyone who will adopt them. In most cases, he is so indifferent that even the names of his grand and great grandchildren are unknown to him, and fearsome indeed are some of their names, for their appellations have been left to the chemical industry, which is marrying them off, so that, all unrecognized as they are by parental authority, they seem destined to be as numerous as the sands of the sea. Some of the projects tabulated have reference to the nitrogenation of peat, but in Germany somewhat parallel studies have been made with lignite.

Other Uses for Coal

The list given under "Other Uses for Coal and Its Byproducts" is at best incomplete, for most of the investigators are working for firms which are unwilling to designate just what they are studying and what results they are getting. The U. S. Bureau of Mines has entered this field to determine the useful hydrocarbons that can be developed from coal gas, water gas and similar sources, natural gas being one. An investigation reported last year by H. G. Turner showed that 36 samples of anthracite heated to a high temperature emitted gas containing from 74.9 to 88.9 per cent hydrogen and that high-volatile anthracite gave a greater volume of such gas than medium or low-volatile anthracite. Opportunities for the manufacture of welding gas, hereby, are foreshadowed.

A new title in the tabulation, "Mine Operating Problems," testifies to the progress being made in what is quite a recent study for the laboratory. It is difficult in many cases to say why the items it contains should not be listed under "Safety and Health," so closely do they relate in many cases to safety. Some problems are old, it is true, but only recently have many of these problems been regarded as matters needing scientific investigation; many have believed that, like sociology, they were problems having to do with a behavior so erratic as to defy all laws and systems, each mine, like each community, having reactions all its own.

Pulverized coal is receiving decreased attention, probably because its major problems have been solved, but fusibility, still a lively subject, has not been awarded a title; reference to it, however, will be found under several heads. It is, moreover, being studied in many company laboratories as a local problem.

Anthracite Institute Laboratory has to its credit a super-magazine feed boiler which is capable of long periods of operation without firing or grate shaking and which gives carbon-dioxide percentages consistently above 16 and ash combustibles below 5, also a magazine-feed service-water heater equally self-acting which, while nearly doubling efficiency, is said to cut attention one-quarter to one-twentieth. Also it is stated that it will cut 75 per cent of the fuel costs where gas hitherto has been used and where hot-water needs are relatively high.

Pipes May Convey Ashes

The institute's "Heat Machine" conveys coal from the coal bin and removes ashes from the furnace for any practical distance around bends and turns for final discharge in the kitchen yard. The boiler of this "machine," specially devised by the institute, is of unusual type. This research organization is planning to remove ashes through small pipes mechanically or by hand. Study also is being made of the heat absorbed by each section of a boiler with various kinds of fuel. Some parts of boiler heating surface are quite active with coal and far less active with gas. It is important to know these facts in order that boilers may be designed with opportunities for heat transfer suited to the fuel.

Finding that many Utah coals make a fluid slag at low temperature, which destroys the grates and interferes with the operation of the furnace, the University of Utah, which attributes this to the high silica content of the ash, is

investigating the possibility of forming by the use of limestone a porous clinker that will melt only at a high temperature. As most Utah cokes are too weak to sustain the heavy loads inevitable in certain industrial applications, the university is attempting to remedy this defect where it exists. The university also believes that many industries now not using coal might use it and that many that are already using coal might use it more effectively.

Research at the University of Utah has proved that the remarkable nonfusing bituminous coals of Utah yield

Coal Research Projects in Progress or Completed in 1935 or Planned for 1936

Air Pollution: Smoke Abatement

Air Hygiene (1935).* Mellon Institute.
Air Pollution (1935).* Mellon Inst.
Cleaning of Shrubbery and Trees Contaminated by Smoke and Dust.* Mellon Inst.
Effect of Pollution on Aviation and Building Materials.* Mellon Inst.
Flue Gas Scrubbing to Remove Fly Ash and Sulphur.* Arthur D. Little, Inc.
Fly Ash and Sulphur in Soot. Commercial Testing & Engineering Co.
Recovery of Sulphur Dioxide From Boiler-Furnace Gases.* Univ. of Ill. with Utilities Research Commission.
Reduction or Removal of Sulphur Dioxide From Plant Flue Gases.* Univ. of Ill. with Utilities Research Commission.
Smoke Abatement.* Mellon Inst.
Smoke-Producing Tendencies of Iowa Coals.* State Univ. of Iowa.

Ash and Clinker

Ash Analysis and Clinker Formation of Coal.* Univ. of Utah.
Analysis of Combustibles in Fly Ash. Brooklyn Edison Co.
Cause of Slag Formation in Furnaces.* Univ. of Ill.
Cinder and Fly-Ash Measurements. Brooklyn Edison Co.
Clinkering of Coal Ash in Laboratory Underfeed Stoker. Univ. of Mich. with Hanna Coal Co.
Fusibility of Coal Ash.* Northern States Power Co.
Fusibility of Iowa Coal Ash.* State Univ. of Iowa.
Fusion Point of Iowa Coal Ash.* Iowa Eng. Exp. Sta.
Relation of Color of Ash to Analysis.* Anth. Inst.
Removal of Ash as Molten Slag From Powdered-Coal Furnaces.* Pitts. Exp. Sta., B. of M.

Briquetting of Coals

Briquetting. Arthur D. Little, Inc.
Briquetting of Alabama Lignites. Ala. Poly. Inst.
Briquetting Partly Volatilized Coal.* Ill. G. S.
Briquetting Without Binder.* Ill. G. S.
Vegetable Binder for Lignite Briquets. Univ. of N. D.
Water-Mixed Organic Binders for Briquetting (1936). Battelle Mem. Inst.

Carbonization and Distillation of Coal (See Also Surveys)

Carbonization of Coal by Electric Energy. TVA.
Carbonizing Properties of American Coals.* Pitts. Exp. Sta., B. of M.
Coal Mixtures for Coke Ovens. Battelle Mem. Inst.
Coking of Coal.* Pa. State Coll. with Central Pa. Coal Producers' Assoc.
Coking Qualities of Utah Coals.* Univ. of Utah.
Conditions of Distillation of Subbituminous Coals Favoring Cracking of Tar and Affecting Yield and Composition of Gases.† Colo. Coll.
Design, Erection and Operation of Small Commercial-Scale Coal-Carbonizing Plant (1935). Univ. of Utah.
Distillation of Subbituminous Coal at Different Temperatures up to 600 deg. C. With Gases Evolved. Colo. Coll.
Domestic Coke. Koppers Construction Co.
Effect of Pressure on Distillation of Subbituminous Coals. Colo. Coll.
Gas-, Coke-, and Byproduct-Making Properties of Illinois Coals (1935).* Ill. G. S.
Influence of Rate of Heating and Maximum Temperature on Properties of Products Obtained From Coal (1931).* Carn. Tech.
Low-Temperature Carbonization of Illinois and Other Southern Coals. Continental Ind. Engrs., Inc.
Operation of Knowles Ovens With Reference to Rate of Heat Transfer and Temperature Distribution. Ill. G. S.
Principles Involved in High-Vacuum Fractional Distillation of Coal (1935).* Carn. Tech.
Properties of Coke.* Pitts. Exp. Sta., B. of M.
Stepwise Distillation of Subbituminous Coal to Determine Yields at Each Step. Colo. Coll.

Chemical Tests of and With Coal

Deoxidation of Coal With Aqueous Alkali (1934).* Carn. Tech.
Determination of Fluorine in Iowa Coals.* Iowa Eng. Exp. Sta.
Determination of Volatile Matter in Pike's Peak Coals.* Colo. Coll.
Halogenation of Coal (1931).† Carn. Tech.
Method of Determination of Volatile Matter in Coal Based on Speed of Evolution.* Univ. of Ky.
Microchemical Analysis of Coal and Coal Products (1931).* Carn. Tech.
Mineral Matter in Coal.* Pa. State Coll.
Reaction of Coal and Hydrogen at Atmospheric Pressure (1935).* Carn. Tech.
Relationship Between Coal-Ash Composition and Softening Temperature.* Ill. G. S.
Relationship Between Mineralogical Composition of Coal Mineral Matter and Chemical Composition of Coal Ash.* Ill. G. S.
Solvent Extraction of West Virginia Coals.* W. Va. Univ.
Solvent Extraction of Coal (1931).* Carn. Tech.

Combustion of Coal and Coal Products

Adaptation of Domestic Stokers to Lignite.† Univ. of N. D.
Burning Characteristics of Fuels in Domestic Service. Battelle Mem. Inst.
Characteristics of Coals for Domestic Underfeed Stokers (1935).* Battelle Mem. Inst. with Bit. Coal Res., Inc.
Characteristics of Coke.* Anth. Inst.
Coal-Burning Equipment and Heat Transfer. Columbia Univ.
Combustion in Domestic Coal Stoker (1936). Ore. State Agri. Coll.
Combustion on Underfeed Stokers (1935).* Battelle Mem. Inst. with Bit. Coal Res., Inc.
Combustion Rate of Solid Pure Synthetic Carbon.* Mass. Tech.
Comparison of Indiana Coals and Those of Kentucky, Pennsylvania and Virginia With Several Types of Domestic Stokers.* Purdue Univ.
Comparison of Three Fusion Furnaces. Comm. Testing & Engrg. Co.
Design of Complete Automatic Heat Machine. Anth. Inst.
Design of Magazine-Feed Service-Water Heater. Anth. Inst.
Design of Super-Magazine Feed Boiler. Anth. Inst.
Design of Super-Magazine-Type Winter Air-Conditioning Unit. Anth. Inst.
Design of Water-Cooled Stoker. Am. Engrg. Co.
Determination of Burning Characteristics of Fuels in Domestic Heating Furnaces.* Pitts. Exp. Sta., B. of M.
Distribution of Radiance in a Furnace. Johns Hopkins Univ.
Draft Hoods in Gas-Fired Furnaces.* Univ. of Ark.
Effect of Inorganic Materials in Combustion.* Pitts. Exp. Sta., B. of M.
Effect of Soot Deposits on Efficiency of Heating Boilers. Pitts. Exp. Sta., B. of M.
Enrichment of Coke-Oven Gas by Catalytic Treatment (1931).* Carn. Inst.
Evaluation of Bituminous Coal for Domestic Use.* Battelle Mem. Inst.
Furnaces.* A.S.M.E.
Heat Insulation. Mellon Inst.
Industrial Application of Stokers. Univ. of Utah.
Mechanical Ash Conveying. Anth. Inst.
Mechanism of Combustion of Solid Fuels (1931).* Carn. Tech.
Mechanism of Combustion of Volatile Matter (1935).* Carn. Tech.
Powdered-Coal Domestic Stoker Using Preheated Air. Purdue Univ.
Pulverized-Coal Burners With Modified Combustion Chamber. Purdue Univ.
Reaction of Coal With Alkaline Permanganate (1934).† Carn. Tech.
Reaction of Coal With Gaseous Oxygen in Aqueous Alkaline Media (1931).* Carn. Tech.
Reaction of Coal With Nitric Acid (1931).* Carn. Tech.
Relative Absorption of Various Boiler Sections With Several Fuels.* Anth. Inst.
Relative Combustibility of Various Anthracites.* Anth. Inst.
Relative Comfort With Various Fuels.* Anth. Inst.
Relative Value of Raw Coal and Smokeless Coal in Various Combustion Appliances. Univ. of Utah.
Relative Value of Stoker-Fired Pocahontas Coal and of Oil. N. & W. R.R. with Poca. Operators' Assoc.
Stoker Performance in Residence Boilers. Kewanee Boiler Corp.
Texas Lignites for Steam Generation. Univ. of Texas.
Thermal Studies for Greater Heat Efficiency. Arthur D. Little, Inc.
Use of Coal Mined Along Chesapeake & Ohio Ry. Lines. C. & O. Ry.
Use of Coal Mined Along Norfolk & Western R.R. Lines (1929). N. & W. R.R.
Use of Fuels in Brick Kilns.* Pitts. Exp. Sta., B. of M.
Use of Washed Iowa Screenings for Domestic Stoker Fuels (1936). State Univ. of Iowa.

Equipment and Material for Mines

Composition and Properties of Explosives and Explosive Materials.* Pitts. Exp. Sta., B. of M.
Decomposition Products of Carbon Tetrachloride Extinguishers.† Pitts. Exp. Sta., B. of M.
Gas Masks, Respiration and Breathing Apparatus for Use in Mineral Industries.* Pitts. Exp. Sta., B. of M.
Kinetics and Mechanism of Explosion and Combustion Reactions. Pitts. Exp. Sta., B. of M.
Physical and Chemical Tests of Explosives and Blasting Devices for Permissibility.* Pitts. Exp. Sta., B. of M.
Wire Rope.* Bureau of Standards with A.S.M.E.

Gas, Use, Manufacture, Purification and Treatment

Activity of Iron Oxide in Gas Purification in Relation to Its Colloid Content. Johns Hopkins Univ.
Compressibility of Natural Gas.* Mellon Inst.
Gasification of Coal With Emphasis on Low-Temperature Carbonization. Chemical Analysis, Tar Processing and Thermal Reactions of Gases. Columbia Univ.
Gums in Gas. Koppers Const. Co.
Liquid Purification of Gas. Koppers Const. Co.
Passage of Finely Crushed Coal Through Hot Tube Into Which Oxygen and Steam Are Conducted and Water Gas Thereby Formed. Univ. of Mich.
Sodium Carbonate as Catalyst in Water-Gas Reaction. Univ. of Mich.
Use of Chlorinated Derivatives of Hydrocarbons From Natural Gas.* Mellon Inst.
Use of Normal Butane, Iso-Butane and Propane as Solvents.* Mellon Inst.
Volatile Matter of Anthracite. Anth. Equip. Corp.

Mine Operating Problems (Purification of Mine Water and Ventilation)

Calculation of Roof Stresses in Coal Mines Using Compressometer.* W. Va. Univ.
Coal Bumps of Harlan County (Kentucky) Coal Fields.* Dept. of Mines and Min., Ky.
Coal Mine Haulage in West Virginia.* W. Va. Univ.
Coal Mining Methods and Practices (1935).* Pitts. Exp. Sta., B. of M.
Determination of Laws of Behavior of Mine Structures by Centrifuged Models.* Columbia Univ.
Flow of Gas in Coal Seams or Gas Sands.† W. Va. Univ.
Ground Movements and Subsidence.* Pa. State Coll.
Ground Movement and Subsidence Caused by Coal Removal.* Pitts. Exp. Sta., B. of M.
Movement and Stresses in Coal Mine Roof (1935).* Pitts. Exp. Sta., B. of M.
Origin and Flow of Methane in Coal Beds of West Virginia. W. Va. Univ.
Selective Mining of Coal. Battelle Mem. Inst.
Stress Distribution in Mine Roofs, Pillars and Floors as Determined by Photo-Elastics and Combined Centrifugal and Photo-Elastic Methods. Columbia Univ.

Oils (Not Necessarily From Coal)

Bodying and Other Processing of Semi-Finished Oils. Foster D. Snell, Inc.
Effect of Motor-Fuel Volatility. Univ. of Mich. with Natural Gasoline Assoc.
Efficiency of Petroleum Fractionating Columns. Univ. of Okla.
Factors Affecting Entrainment in Bubble-Cap Columns. Univ. of Okla.
Firebrick Arrangements for Domestic Oil-Burning Furnaces.* Ore. Sta. Agri. Coll.

as much oil per ton as the average oil shale, but of superior quality. This coal-oil reserve already developed by coal mines, railroads and towns is said to have five times the estimated supply which the oil shales of that State would afford. The gas is said to have a heat value equal to that of natural gas and to give a solid smokeless fuel with good handling properties and well suited to combustion in all domestic heating appliances. Such products, if manufactured and sold, should eliminate smoke from Rocky Mountain cities which during winter months suffer so

Coal Research Projects in Progress or Completed in 1935 or Planned for 1936

Heavy Fuel Oils and Other Asphaltic Oils in Relation to Gas Industry (1936). Columbia Univ.
Oil Emulsions. Foster D. Snell, Inc.
Petroleum Refining.* Mellon Inst.
Polymer Gasoline From Cracking. Universal Oil Products Co.
Physical and Thermodynamic Properties of Hydrocarbon Oils Between 60 and 220 Deg. F. and up to 3,000 Lb. Pressure. Calif. Inst. of Tech. with A.P.I.
Laboratory Cracking Data as Basis for Plant Design. Univ. of Mich.
Stage Separation of Crude Oil and Gas Mixtures. Univ. of Okla.

Other Uses for Coal and Its Byproducts

Activated Carbon From North Dakota Lignite.* Univ. of N. D.
Ammoniation of Peat for Fertilizers. Bur. Chem. and Soils, Dept. of Agri.
Chemicals Derived From Coal. Arthur D. Little, Inc.
Carbon for Decolorization From Alabama Lignites. Ala. Poly. Inst.
High Nitrogen Material From Urea-Ammoniated Peat. Bur. Chem. and Soils, Dept. of Agri.
Hydrogenation of Bituminous Coal. Pa. State Coll. with Bit. Coal. Res., Inc.
Hydrogenation of Coal (1935).* Pitts. Exp. Sta., B. of M.
Hydrogen Production From Lignite by Modified Water-Gas Reactions.* Univ. of Minn. with N. W. Res. Inst.
Inexpensive Plastic for Construction Material Derivable From Coal Byproducts. Battelle Mem. Inst.
Influence of Aluminum Chloride on Pure Hydrocarbons. Western Reserve Univ.
Mechanism of Formation of Water-Soluble Nitrogen Constituents in Ammoniated Peat. Bur. Chem. and Soils, Dept. of Agri.
Nitrogen Compounds From Waste Liquors in Byproduct Coking.* Mellon Inst.
Nitrogenous Composition of Ammoniated Peat and Relation Products. Bur. Chem. and Soils, Dept. of Agri.
New Byproducts from Coal. Koppers Const. Co.
Polymerization of Cyanamide to Dicyanodiamide. Bur. Chem. and Soils, Dept. of Agri.
Resinification of Lignite Tar Acids With Reference to Varnish.† Univ. of N. D.
Surface Reactions of Carbon Black. B. F. Goodrich Co.
Synthesis of Useful Hydrocarbons From Coal Gas, Water Gas, Natural Gas, Etc. Pitts. Exp. Sta., B. of M.
Thermal Reactions of Ethylene. Western Reserve Univ.
Utilization of Coal-Mine Wastes.* Univ. of Ill.

Physical Tests for Coal, Including Agglutination

Compressibility and Crushing Strength of Pittsburgh Coal Bed.* Pitts. Exp. Sta., B. of M.
Friability of Coal. N. W. Exp. Sta., B. of M., with Univ. of Wash., Fuels Res. Lab., Can., all with Comm. D-5, Coal and Coke, A.S.T.M.
Grindability of Coal.* Battelle Mem. Inst.; N. W. Exp. Sta., B. of M. with Univ. of Wash.; Fuel Res. Lab., Can.; Fuel Eng. Co.; Foster-Wheeler Corp.; Babcock Wilcox Co.; Carn. Inst.; all with Comm. D-5, Coal and Coke, A.S.T.M.
Mechanism of Coal Combustion and Ignition. H. C. Porter.
Plasticity of Coal.* Pitts. Exp. Sta., B. of M.
Slacking of Montana Subbituminous Coal. Univ. of Mont.
Softening of Coal by Heat. H. C. Porter.
Standardization of Method of Determining Agglutinating Values of Coals.* Pitts. Exp. Sta., B. of M.

Preparation of Coal

Development of Baum-Type Jig.* Battelle Mem. Inst.
Development of Launder Process of Cleaning Coal.* Battelle Mem. Inst.
Development of New Automatic Control for Withdrawal of Refuse from Jigs. Battelle Mem. Inst.
Development of Plunger-Type Jig With Cams to Provide Variety of Strokes. Battelle Mem. Inst.
Effect of Preparation on Composition and Ash-Softening Temperature of Ash of Illinois Coal. Ill. G. S.
Improvements in Air Table With Super-Hindered Settling. Battelle Mem. Inst.
Mechanical Methods of Cleaning Coal.* N. W. Exp. Sta., B. of M.
Relation of Type of Stroke to Jig Efficiency.* Battelle Mem. Inst.
Study of Washery Efficiency in Relation to Reduction of Good Coal Losses in Refuse.* S. Exp. Sta., B. of M.
Washability of Iowa Coals.* State Univ. of Iowa.
Washability of Washington Coals.* N. W. Exp. Sta., B. of M.
Washing Central Illinois High-Ash-and-Sulphur Coal for Power-Plant Use (1935).* Utilities Res. Comm.

Purification of Mine Water

Disposal of Waste Waters From Mines.* Pitts. Exp. Sta., B. of M.
Inhibition of Acidity in Mine Water. W. Va. Univ.
Purification of Water From Sealed Mines and Strip Pits. Ind. Conservation Dept.

Safety and Health

Behavior of Different Coal Dusts as Regards Flame Propagation.* Pitts. Exp. Sta., B. of M.
Composition of Mine Atmospheres.* Pitts. Exp. Sta., B. of M.
Electrical Equipment in Mines.* Pitts. Exp. Sta., B. of M.
Inflammable Limits and Ignition Temperatures of Gases and Tars.* Pitts. Exp. Sta., B. of M.
Inflammability of Coal Dust.* Pitts. Exp. Sta., B. of M.
Methods for Measurement of Concentration of Atmospheric Dusts.† Pitts. Exp. Sta., B. of M.
Mine-Fire Investigation (1935).* Pitts. Exp. Sta., B. of M.
Occurrence and Explosibility of Gases in Underground Openings.* Pitts. Exp. Sta., B. of M.
Physiological and Pathological Action of Gases and Vapors.† Pitts. Exp. Sta., B. of M.
Pneumoconiosis* and Physiological Effects of Air Mixed in Definite Proportions With Products of Combustion From Different Fuels. Mellon Inst. with Pitts. Dept. of Pub. Health.
Warning Agents for Bottled Gases.* Pitts. Exp. Sta., B. of M.

Surveys

Botanical Constituents (Especially Spore Content) of No. 6 Illinois Coal (1934).* Ill. G. S. with Nat. Res. Council.
Carbonizing Properties, Microstructure and Petrographic Analysis of American Coals.* Pitts. Exp. Sta., B. of M.
Cherokee Shales and Coal Beds of Southeastern Kansas.* Kan. G. S.
Classification of American Coals.* Pitts. Exp. Sta., B. of M.
Classification and Selection of Illinois Coals.* Ill. G. S.
Deterioration of Laboratory Samples of Illinois Coals During Storage.* Ill. G. S.
Distribution of Unit Coal Values of No. 6 Illinois Coal and of Sulphur Content in Illinois Coals (1934).† Ill. G. S.
Fuels Trends in the United States. Mass. Tech.
Fusain Content of Coal Dust From an Illinois Dedusting Plant (1934).† Ill. G. S.
Geological Structure Southeastern Kansas Coal Fields and Kansas Lead-Zinc District. Kan. G. S. with U.S.G.S. and PWA.
Literature Survey on Coal. Pa. State Coll.
Mapping of Areas in Western and Central Illinois, Suited to Coal Stripping (1935).* Ill. G. S.
Operation of Domestic Heating in Columbus, Ohio. Battelle Mem. Inst with Bit. Coal Res., Inc.
Pennsylvania Measure Stratigraphy in Western Illinois.† Ill. G. S.
Physical and Botanical Constitution of Illinois Coals (1931).* Ill. G. S.
Physical and Chemical Characteristics of Illinois Commercial Fines.* Ill. G. S.
Physical and Chemical Properties of Washington and Other Cokes.* N. W. Exp. Sta., B. of M.
Physical Characteristics of Vitrain in Illinois and Other Coals.* Ill. G. S.
Price Fixing in Bituminous Coal Industry. W. Va. Univ.
Properties of Pennsylvania Bituminous Coals, With Special Reference to Utilization.* Pa. State Coll.
Rate of Degradation of Iowa Coals in Storage and Formation of Humic Acids.* State Univ. of Iowa.
Relative Values of Coal and Oil-Shale for Production of Oil and Gas. Univ. of Utah.
Sampling, Analysis and Composition of American Coals.* Pitts. Exp. Sta., B. of M.
Separable Mineral Matter in No. 6 Illinois Coal at Orient Mine.* Ill. G. S.
Stratigraphy of Fayette, Jefferson, Clearfield and Somerset Counties.* Pa. G. S.
Stratigraphy of Greenbrier County. W. Va. G. S.
Stratigraphy of Iowa Coal Measures.* Iowa G. S.
Structural Studies of No. 6 Illinois Coal (1935).* Ill. G. S.

Tar and Tar Products

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Low-Temperature Tars From Combustion of Bituminous Coal.* Mellon Inst.
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Nature of Tars From Different Conditions of Distillation of Subbituminous Coal.* Colo. Coll.
Neutral Fractions of Low-Temperature Tars and Extracts (1933).* Carn. Tech.
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Ventilation

Air Currents Through Timbered Models.† Univ. of Ill.
Air-Measurement Instruments.* Pitts. Exp. Sta., B. of M.
Fan-Performance Charts* Pitts. Exp. Sta., B. of M.
Ventilation of Coal Mines.* Pitts. Exp. Sta., B. of M.
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Sampling of Pulverized Coal in Moving Gas Streams.* A.S.M.E.
Specific Heats of Gases at High Temperature by Explosion Method.* Pitts. Exp. Sta., B. of M.
Spontaneous Combustion in Stored Coal. Purdue Univ.
True Density of Coal and Coke (1931).* Carn Tech.
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*Items starred indicate that work on such projects was still continuing at the close of 1935. †Items marked with a dagger were concluded in that year. Figures shown in parentheses indicate year in which particular research project was started. Absence of notation indicates that informant failed to indicate status of project. Certain of the items in the listing might with almost equal propriety be grouped under some other head. Where the project is of multiple interest, requiring listing in more than one subject group, it is placed either under "Surveys" or "Miscellaneous."

acutely from it. A coal-treating plant large enough to supply 1,000-B.t.u. gas and electric power to a town of 1,000 people has been erected. The smokeless fuel is 4 per cent more efficient than raw coal in cook stoves, 7 per cent in a Heatrola, 16 per cent in a room heater, and 66 per cent in a fireplace.

At West Virginia University, a method of studying the mechanism of the reaction of $FeS_2 + O_2$ has been developed, and the rest of the academic year will be devoted to this reaction, which has such a potent effect in the acidification of mine water. During 1935, a laboratory method for studying the flow of gas in porous beds was devised.

A section of a mine is being operated for production by the Pittsburgh Coal Co. under cooperative observation of the Bureau of Mines. Rooms are being driven and pillars withdrawn on a triple shift to ascertain if more favorable conditions will be obtained with rapid extraction, to discover, if possible, the best conditions for roof control and to find out just what occurs in a working place during pillar withdrawal. Rooms are 14 ft. wide and at 78-ft. centers, and pillars are being drawn in groups of four or five with a stepped breakline averaging about 45 deg.

To withdraw pillars a butt-off is driven so as to leave a 5-ft. fender against the goaf. This butt-off is skipped on the side nearest the entry as many times as appears safe, the space thus opened being heavily timbered. When it seems inadvisable any longer to continue this skipping, the butt-off thus enlarged is abandoned and the posts, as far as possible, are withdrawn, letting the roof fall and leaving the fender to be crushed by the descending roof. Does this fender crush and leave the roof down satisfactorily, or should it be partly mined or shot to reduce its resistance and does its resistance in any important degree hamper the proper roof subsidence and relief of weight?—are some of the questions being studied. These it is hoped to answer from the graphs drawn by subsidence, or convergence, recorders of Winstanley type. A revolving drum registers the number of inches through which roof and floor approach each other under the stress involved in these operations.

MINE OPERATORS

+ Extend Use of Power and Machinery

ALTHOUGH 1935 brought no sweeping changes in electrical and mechanical equipment used in coal mining, it was a year of steady progress in the direction of safer, more economical and more reliable equipment. The changes made were largely in refinements in details and design and in maintenance methods to keep machinery abreast of increases in efficiency resulting from generally improved methods and more exacting management. Materials of more desirable characteristics combined with ingenious designs have bettered performance, reduced maintenance cost and reduced weight and dimensions of machinery to satisfy the demands of increasing mechanization and mining in thinner seams.

Maintenance costs of mobile-type loading machines, including labor, lubrication and trailing cables, are now averaging less than 5c. per ton at a number of mines. Mine operators considering mechanization with the latest types of loaders can safely figure the maintenance will not exceed 4c. per ton, assuming efficient handling.

Substation practices changed but little during the year. Many substations were moved to load centers to provide the closer voltage regulation which is a primary requisite for economic operation of loading-machine and conveyor mining. Portable units received increased attention and steps were taken to develop units of this type for installation in the thinner seams. In a number of cases where the substation units had been operating with manual control, coincident with the moving, the controls were changed to full-automatic. Additional substation capacity has been found necessary at a number of mines of both the hand and mechanical types. In some cases where mining has been carried back for considerable distances from the opening, operating companies have found it desirable to restrict a part or all of the original conversion equipment to supply the main-line trolley system and to install additional units, either on the surface or in the mine, primarily to supply equipment in the working sections.

A development in the lightning protection of outside substations installed on rocky promontories, where low resistance grounds are not available at the surface close to the substation, is to interconnect the arrester ground to the d.c. negative grounded feeder line, which in turn is grounded at the closest available wet point. Years of experience probably will be required to test adequately the efficiency of the connection.

Feeder practice, both a.c. and d.c., in boreholes, shafts and long mine passageways was marked by a further increase in the use of non-metallic cables. At Bartley, W. Va., the Pond Creek Pocahontas Co. installed what is said to be the largest and longest d.c. coal-mine cable suspended vertically and supported entirely by the conductor. This single-conductor, rubber-and-braid-covered cable has a copper area of 1,500,000 circ. mil and is suspended in an 836-ft. borehole. The largest three-conductor a.c. cable used by the coal industry is the 800,000-circ. mil cable installed recently in Greenwood shaft of the Lehigh Navigation Coal Co., Lansford, Pa. This cable, of 880 ft. vertical length and weighing 16,544 lb., is supported by the armor wires.

Installing electric cables inside of pump borehole discharge columns and using welded borehole casings for negative d.c. conductors are two innovations that appeared during the year. At the Glen White (W. Va.) mine of the Koppers Coal & Transportation Co., a 3-in. conduit was installed in the center of a 12-in. discharge column and three 4/0 rubber-covered wires were placed in the conduit to carry a.c. power to the underground pumping station. At the Stanaford mines in the same county, controlled by the same company, the same general plan was followed in the location of a conduit to carry a positive feeder, but in addition the water casing was welded to form a continuous conductor for the negative side of the circuit.

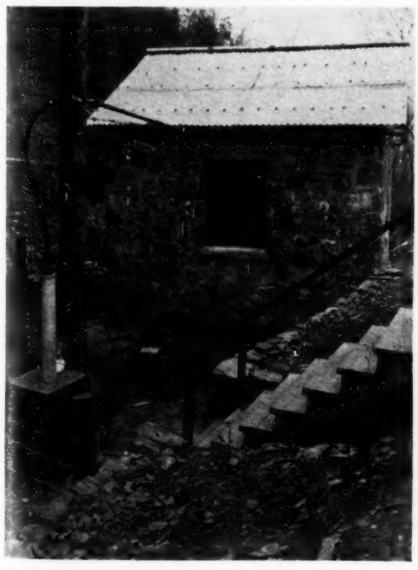
Use of asbestos-insulated cables in the repair of stationary motors and other mining machinery on which wiring is regularly subjected to heat or is liable

to that effect in case of unusual conditions has been increasing. Improvements in mining-cable construction included a new "loom-sheath" type embedded in Glyptal cement and designed to give maximum resistance to abrasion, oils, acids and alkaline substances. An "outer-sheath" cable of the same general type, but designed for use in oily locations where abrasion is not of primary importance, also was put on the market.

Lower height, more chained axles, increased efficiency of battery units and safer cable practice on explosion-tested reel locomotives marked the haulage power developments of the past year. Manufacturers designed main haulage locomotives for lower heights and many coal companies rebuilt their gathering units to work with greater safety and efficiency in thinner seams. More locomotives were equipped with chain-drive connections between axles to permit operation of motors permanently in series or to encourage use of the series connection on units where the series-and-parallel arrangement was not altered.

A gassy mine in West Virginia was equipped with 8-ton gathering locomotives having a new double-drum explosion-tested gearless reel. The use of the two single-conductor cables increases safety by separating the two polarities and also reduces cable renewal cost. One drum being attached to the armature and the other to the motor frame (which is bearing mounted), the cables may wind or unwind at different speeds, thus maintaining equal pull on the cables. At the "wireless" mines, changes made or completed during the year have increased the service efficiency of battery haulage and promise to increase battery life.

At this new substation of the Pond Creek Pocahontas Co. a 1,500,000-circ.mil copper cable insulated with rubber and braid is suspended by the conductor in an 836-ft. borehole



Using ¼-in. electrodes for welding filler bands into tires at the central shop of the Pocahontas Fuel Co.

Worm-gear drives were replaced by spur-gear drives, chasses rebuilt to include anti-friction journal bearings and in some cases the voltage was increased by increasing the number of cells per battery.

Coal-cutting machinery was marked by a change to more general use of thin-kerf bars and by improvements in control and flexibility. A number of patented cutter-bit designs were placed on the market.

New installations of deepwell turbine pumps loom as the feature of the year in mine dewatering practice and the New River and Winding Gulf districts of West Virginia lead in the applications of this type of pump. Installation of a unit rated at 2,000 gal. per minute is now under way at a 500-ft. borehole.

Additional installations of airplane-propeller-blade mine fans continued to reduce power requirements for mine ventilation. It is estimated that between 350 and 400 fans of this type are now in use at coal mines of this country. Gear connections between motors and fans appear to be passing out of the picture. Practically all new installations utilize V-belts and at one large gassy mine the gear drive installed seven years ago is being replaced by V-belts as a precaution against the possibility that the gear might some time give trouble and cause a long delay to ventilation. A new type of fan, for which high efficiencies were reported, was introduced at some of the mines of the Pittsburgh Coal Co. This fan has four propeller blades and stream fairings over the propeller shaft and bearings, over the vertical support for these bearings and over each half of the driving belt. The fan also is equipped with vanes to direct the air and with a Venturi opening in the throat of which the fan operates.

Improvement in handling and applying mine-car lubricants and the rather general adoption of the arcweld-filler-band method of rebuilding locomotive tires are outstanding in the maintenance field. Electrically operated grease dispensers which pump directly from the shipping container are effecting direct savings in labor and lubricants amounting to 100 per cent per year on the investment—these are the reports from typical installations. The less tangible savings of superior lubrication by avoiding all contamination of grease by dirt and sand are factors which in themselves may justify purchase of new greasing equipment. Use of meters in each hose connection as a means of definitely limiting the quantity of grease applied to each mine-car bearing and to indicate positively that each bearing gets grease is proving advantageous.

Sizes of steel stock used in filling worn tires fall in the range between $\frac{3}{8}$x1¼ in. and ½x2 in. and the carbon content in the range between 0.40 and 0.80 per cent. Use of the harder steels of content between 0.60 and 0.70 is now the practice at a number of mines. Electrodes $\frac{3}{16}$ to $\frac{3}{8}$ in. in diameter are used in welding the bands to the tire. The ¼-in. size, which requires a welding machine rated at 300 amp., is the more common practice. Only a few companies have the 600-amp. machines and thus are equipped to use $\frac{3}{8}$-in. electrodes, which speed welding but release an uncomfortable amount of heat in the welder's booth.

Welding of mine-track rails to eliminate loose joints, to hold the track to gage and/or to provide improved electrical bonding was continued by a few companies during the year. At several mines in the New River and Winding Gulf districts of West Virginia the welding of track steel to form continuous rails was extended to include prac-

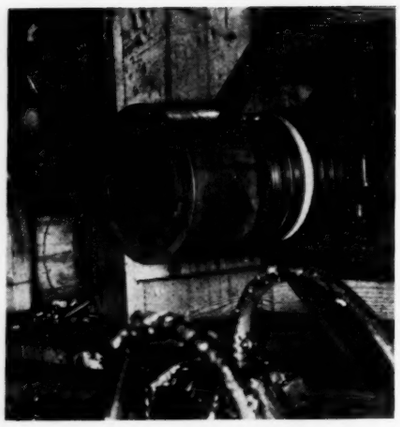
tically all main lines. A recent practice at the mines of the Valley Camp Coal Co. is to weld two pieces of heavy rail across the track at each staggered rail joint. These pieces hold the rails to gage and serve as bonding. The electrical effect is to parallel the two rails of each 16-ft. length of track that is unbroken by rail joints and to connect the parallel sections in series by short lengths of continuous rail.

New Mechanical Aids in Service

A new type of mine-car axle, a "slip-ring" starter and double-strength steels, all recent mechanical developments, were applied to regular jobs during the year. A new idea in the infinitely adjustable speed-transmission field was announced and tests were being made on double-sealed anti-friction bearings applied to underground equipment. The axle, developed by A. R. Long, superintendent, Summerlee (W. Va.) mine of the New River Co., was applied to 500 cars which went into service at that operation. In general design, the car resembles the standard four-axle type, but the two wheels of each truck are held in perfect alignment at all times by a tie consisting of the drop axle, which has a limited freedom of vertical movement and adds only 1 in. to the car bottom thickness.

In rebuilding its Tamaqua breaker the Lehigh Navigation Coal Co. made use of a special "slip-ring" starter to adapt plain squirrel-cage motors to hard-starting loads which otherwise would have required the more expensive and less reliable slip-ring motors and starters. The starter is an automatic clutch-type hub on which is mounted the driving pulley or sprocket.

During the year operating tests got under way to determine the suitability



Slip-ring starter permits motor to gain considerable speed before engaging load

of double-sealed anti-friction bearings for duty such as armature bearings on mine locomotives. Indications point to the desirability of continuing to grease the space surrounding the bearing, thus aiding the bearing housing seals in keeping out dirt and also with the idea that a small quantity of lubricant will work by the built-in seals of the bearing proper and add to the insurance of sufficient lubrication without over-lubrication.

In the field of miscellaneous electrical items which have applications in coal mining, production of a new insulation, motor-dimension standardization, transformers with self-contained lightning arresters, and the announcement of new testing instruments were features of the year. The new insulation, consisting of finely ground India mica and glass with a potassium binder, offers superior protection for permissible and other closed equipment, in which there is an inherent tendency toward the formation of nitric acid if arcing is present. Adoption of standard dimensions for a number of sizes of electric motors enables users to substitute one motor in the place of another of equal rating without rebuilding or changing the base foundation or mounting.

Add to Generating Facilities

Two complete power plants went into service in 1935. One constructed by the West Virginia Coal & Coke Corporation at Omar, W. Va., serves all seven of the company's Logan County mines at savings of $10,000 to $15,000 per month. The new Linton (Ind.) mine power plant of the Antioch Power Co., equipped with three 2,000-kw. turbo-generator units took over the loads of the Sherwood-Templeton and Linton-Summit companies last year. Fuel for this plant consists of sludge pumped from near-by washeries.

During the past year the Clearfield Bituminous Coal Corporation enlarged its central electric power plant and increased its efficiency by installation of a 1,000-hp. (normal rating) Combustion Engineering Co. water-tube boiler equipped with Detroit spreader-type stokers. This stoker equipment enables the plant to generate steam using unmarketable coal consisting of picking-table refuse and mining-machine cuttings. Bell & Zoller Coal & Mining Co. installed a 4,000-kw. turbine at Zeigler No. 2 and the Knox Consolidated Coal Corporation added a 1,650-kw. turbo-generator to facilities at its No. 1 mine power plant. A new boiler house was built at its Portage (Pa.) operations by the Johnstown Coal & Coke Co.

SAFETY RECORD

+ Last Year Close to 1933 Mark

By DANIEL HARRINGTON
Chief, Health and Safety Branch
U. S. Bureau of Mines

PRELIMINARY ESTIMATES indicate that 1935 accident rates for coal mining (both anthracite and bituminous) will be but little, if any, higher than those for 1934. The 1934 rates were only slightly less favorable than those for 1933—the best year by far in the history of coal mining in the United States. Moreover, the 1935 accident rates for bituminous coal mining will certainly be lower than those for any other year except 1933 and 1934, although those for anthracite will be considerably higher. The year probably will show decreased rates in accidents from falls of roof and coal and from electricity, and either slightly increased or essentially the same rates from such causes as haulage, explosions of gas or dust, explosives, machinery, and from those labeled miscellaneous.

Operators and safety workers who are endeavoring to lower the admittedly high rate of fatal accidents have much reason for encouragement in the fact that the coal mines of the United States have operated for another year with relatively few major disasters—that is, disasters in which five or more lives were lost. In this respect the record

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for 1935 is better than for any other year in the present century except 1921, 1933 and 1934. There were four major coal-mine disasters in 1935, with a total of 35 deaths. Two of these disasters occurred in anthracite mines, one an explosion causing thirteen deaths and one a cage accident causing seven deaths; and two of them occurred in bituminous mines, one an explosion causing nine deaths and one a fire causing six deaths. In 1934 there were two major disasters, both in bituminous mines—one an explosion with seventeen deaths and one a fire with five; in 1933 there was only one major coal-mine disaster—an explosion with seven deaths in a bituminous mine.

Nevertheless, bituminous coal mining with its thousands of mines, many of them gassy and all of them afflicted with the hazard of explosive coal dust, now has the decidedly good record of having operated for three consecutive years with but one major explosion per year. However, our bituminous mines in 1934 and 1935 had two relatively unusual major disasters: namely, underground fires, five persons being killed in a bituminous mine fire in 1934, and six in 1935. Moreover, in 1935 our bituminous mines seem to have had an unusual number of mine fires in or around shafts and it may be well for our coal-mining people to increase precautionary measures against fires either in shafts or in other underground workings.

A major explosion disaster in January, 1935, interrupted a very nice record for anthracite mines in the avoidance of such accidents, the last previous major explosion disaster in an anthracite mine having been in May, 1931 (or nearly four years of immunity).

Avoiding Major Disasters

Some of the individual States are making real records in avoiding major coal-mine disasters. When a shaft fire killed six persons in a West Virginia coal mine in May, 1935, it was the first major mine disaster in that State since November, 1931, about 3½ years—a remarkably fine record for a coal-mining State with hundreds of inherently dangerous mines. Illinois, with its considerable number of coal mines, many with extra hazardous conditions, has avoided a major mine disaster since December, 1932. Alabama, with its almost innumerable variations in mining conditions and with scores of decidedly dangerous mines as far as natural hazards are concerned, hasn't had a major disaster since December, 1931—more than four years. Indiana hasn't had one in the five years since January, 1931; Ohio, Oklahoma, Washington, and Utah have been free of them for at least five years; Colorado, at one time "famous" for the frequency of its major coal-mine disasters, hasn't had one in nearly nine years; and Wyoming, also with a bad past record, hasn't had a major coal-mine disaster in more than eleven years.

The relatively greater decrease of accidents in coal mining during the past five-year period is due to numerous reasons, agencies, and conditions. Among these is publication of exceptionally good safety records made by coal-mining organizations and by individuals, thus showing that coal can be mined with relative freedom not only from disasters or single or multiple fatal accidents but even from disabling or lost-time accidents of any kind. The depression was another factor, because it forced a rigid stock-taking of the items entering into the cost of producing coal. In doing this, the wide-awake coal-mining people found that accident occurrence is responsible for an appreciable percentage of the total cost of coal production, that it is a very definite and utterly unnecessary "tax" not only on the mine operator but to even a greater extent on the worker, and that by the use of readily applied methods of accident prevention much if not all of this waste can be avoided.

Possibly as many as 10 per cent, but certainly not more than 20 per cent, of our mining people believe that coal can be produced with an accident occurrence but little if any greater than that in other more or less similar lines of industrial endeavor. The main bar to the operation of mines with reasonable safety is a fatalistic mental attitude that even now afflicts most of those engaged in the industry, a belief that mining is inherently unsafe, that efforts to make it safe or reasonably safe are futile, and that safety in mining is a fad or the vision of dreamers. This attitude was almost universal among those engaged in the industry until about ten years ago; however, at present there are some mine operators and perhaps a smaller percentage of mine workers who *know* through actual trial and experience that mining can be made safe if the right mental attitude is maintained and if enough sustained effort is directed against occurrence of mine accidents.

Education unquestionably is an effective, even though rather slow, means of bringing about conditions that will reduce the accident rates for all of the mines of the United States to the low rates now attained by some mines that are getting good results from safety practices and methods. Safety education is becoming a well-recognized part of the operation of up-to-date coal mines, and the demands upon State and federal agencies for safety instructional courses far exceed the ability to supply them.

The first-aid and mine-rescue work of the Bureau of Mines probably is the most popular, as well as one of the most effective, of the various mine-safety educational activities. This work started when the Bureau was created in 1910 and reached its peak in 1931, when more than 112,000 persons in the mining and allied industries were given the full course of training in those subjects. More than 400,000 of these courses were given during the past five years, and the demand for the work now far outstrips the ability of the Bureau's limited personnel and available funds. Many other educational facilities in safety are now available to workers in our mines and mining plants, several of these being given by the Bureau of Mines, some by the various States, and some by other agencies. All of them unquestionably have a good influence.

Another effective agency in forwarding health and safety in mining is the relatively close cooperation now in effect between the federal and State agencies working for the curtailment of accidents and ill-health in mines and mining plants. Exchange of ideas and cooperation in the making of rules, regulations, inspections, etc., have resulted in much wider dissemination of available information regarding advantageous methods and practices for making

• Until about 1931, safety in coal mining in the United States made rather slow progress, and even this was not consistent or well sustained for any appreciable number of consecutive years. During the past five years, however, safety achievement has been far better than for any similar period in the history of the industry, and there is substantial reason to believe that this is not a "flash in the pan" but an indication of better progress to come.

mines and mining plants safer places in which to work.

In recent years the main responsibility for mine safety and the lives and limbs of all employees has been laid strictly on the supervisory forces of the mine or plant. Laws assess the cost of compensation for accidents (and for some types of ill-health in some States) on the operating company. Operating officials, therefore, now bear much of the burden of preventing accidents and obviously need all the knowledge of safety practices and methods they can obtain. To meet this need, the Bureau of Mines gives an accident prevention course to bituminous coal-mine officials, and the demand for this work also is much in excess of the Bureau's ability to supply it. However, within the past five years this rather intricate and extended course has been given to more than 5,000 bituminous coal-mine officials and unquestionably has been a favorable factor in the rather encouraging decrease of accident occurrence in bituminous mines.

The mine worker himself is really the person most definitely concerned with mine safety, yet he usually is difficult to convince when it becomes necessary to alter an existing long-used practice, even for one known to be safer. The first-aid training course offered by the Bureau of Mines, and now very popular with those engaged in mining, is a good channel through which to reach the mine worker with accident-prevention doctrines. Between 50,000 and 100,000 persons in the mining and allied industries now take this course annually. Another method of reaching the mine worker with safety doctrines is through the chapters of the Holmes Safety Association. These are essentially safety clubs in which men and management participate in discussing safety in its various phases. More than 300 of these chapters have now been established, chiefly at bituminous mining localities in Pennsylvania, Alabama, Illinois, Ohio, Kentucky, Indiana, and Iowa.

Although much improved during the past five years, the accident rate in the coal-mining industry still is by far the highest of the major lines of industrial endeavor in the United States as well as the highest of the countries of the world in which coal mining is done to any great extent. That there is no real necessity for the high accident rate in our coal mines is proved by the fact that during the past five or six years many individual mines or mining companies have been operating for a year or more without accidents, and in doing so have reduced not only the misery due to accidents but operating costs as well. Partly as a result of the twenty or more years of effort by the Bureau of Mines, mine-explosion disasters have been reduced 90 or more per cent both in actual number and in fatalities caused. Unquestionably, the other types of mine accidents, such as those from falls of roof or of persons, from haulage, explosives, electricity, etc., can also be reduced 75 to 90 per cent if all—instead of relatively a few—of our mining people can be made to realize that accidents in and around mines can be avoided. This can best be done by education rather than by force, and the federal government through the Bureau of Mines is the agency by far best equipped to do this educational work. The results that can be achieved are reflected in the small number of major disasters during the past few years and in lower fatality rates during the past five years than for any similar period in United States coal mining history.

PREPARATION ACTIVITIES

+ Leave Mark on Equipment and Methods in 1935

IN CONSIDERING developments in bituminous coal preparation in 1935, it is necessary to go back to 1931 to find a year of comparable activity. Behind all the preparation measures taken in this and preceding years was the paramount question of the attitude of the consumer interested in lower cost, greater efficiency or added convenience, often with rival fuels jogging his elbow, toward the product offered him. But, while operators continued their efforts to provide a cleaner product more carefully sized and otherwise treated to perform efficiently under the more stringent requirements of today, they also kept a careful eye on preparation-plant design and equipment for the several purposes of preventing loss of coal values, either directly or through excessive size degradation; reducing power consumed per ton of coal cleaned; and decreasing the labor cost of turning out a product of the required specifications.

New construction in 1935 largely followed the two major paths marked out in the past: replacement of outmoded operations with complete new plants, and reconstruction of existing operations to bring them in line with present-day standards. The latter activity became an even greater factor in the preparation picture in 1935, as evidenced by the number and geographical distribution of such projects, which ranged all the way from installation of a single screen or boom for making or loading an additional size to wholesale revisions, leaving little but the shell of the original plant in place.

From the standpoint of beneficiation through removal of impurities, the finer sizes from $\frac{1}{2}$, $\frac{3}{8}$ or $\frac{1}{4}$ in. down continued to offer the most difficulties, both from the standpoint of actual impurity removal and their capacity for retaining moisture. The latter question, involving either objections to moisture itself as a species of impurity or because of the penchant of moist coal for freezing, proved troublesome to many operators and resulted in a number of instances in the adoption of dry cleaning for the finer sizes, the installation of mechanical or heat-drying equipment or the use of chemicals (notably calcium chloride) to retard freezing. Mines with dry tables for coal cleaning continued, in a number of cases, to experience interference with table operation due to excess moisture in the feed, with the result that some resorted to the use of heated air. Varying success is reported.

While, as indicated above, dry cleaners were adopted in a number of instances, primarily for cleaning the finer sizes, construction records show a still-continuing predominance of wet-washing systems. Three new washers made their bow in 1935: the Llewellyn automatic jig washer (*Coal Age*, July, 1935, p. 318), the Vissac jig and the chloride washer. Operation of the Vissac jig is based on imparting pulsations to the water in the washing compartment through the action of a butterfly valve, which allows water under head to move up through the coal bed in regular surges. Prescreening is necessary with this equipment, which requires a feed with a 2:1 size ratio.

The chloride washer (Fig. 1) makes use of a calcium-chloride solution with a specific gravity greater than water.

A slight velocity is imparted to the solution by impellers similar to those used on boats. Clean coal is removed from the top of the solution by an inclined conveyor, while the refuse sinks and is removed from the washing compartment by a screw conveyor which discharges onto a separate refuse conveyor. The washer, according to the manufacturer, is self-contained, requires no manual or float-control adjustments to compensate for varying percentages of refuse, is adaptable to installation in existing plants with a minimum of changes in structure, and will follow closely the washability curve of the coal. It is offered for sizes from 6-in. egg down to $\frac{3}{8}$-in. pea.

More Cleaners Installed

Major centers of activity in the installation of mechanical-cleaning equipment (see summary on p. 68) were Illinois, Indiana and southern West Virginia. Several installations also were reported for Pennsylvania, and one or more mechanical cleaning units went in in Kansas, Kentucky, Ohio, Tennessee and Washington. Illinois continued to maintain its leadership in individual plant capacity. The Zeigler plant of the Bell & Zoller Coal & Mining Co., preparing coal from both the No. 1 and No. 2 mines of the company, went into operation in the last half of 1935 and reached 950 of its rated capacity of 1,000 tons per hour. The Zeigler plant is one of several combination projects installed in recent years, and is equipped with sand-flotation cones for the 6x$1\frac{1}{2}$- and $1\frac{1}{2}$x$\frac{7}{8}$-in. sizes and air-flow cleaners for the $\frac{7}{8}$x0-in. fines.

A contract for a central plant at Harrisburg for either or both shaft or strip coal was let by the Sahara Coal Co. in December. Rated capacity is 825 tons per hour, and equipment will include three air-operated jigs with a capacity of 600 tons per hour for the 6x0-in. size, three Christie dryers for drying the $\frac{7}{8}$x0-in. fraction at the rate of 100 tons per hour and screening facilities for making eight primary sizes, as well as special primary and secondary crushing facilities and machinery for the selective mixture of any of the sizes made or for loading any size or mixture of sizes in box cars. Installation of the box-car-loading facilities is a reflection of the increasing demand for shipment in this type of equipment experienced by southern Illinois operators in late years.

Both mechanical and heat dryers feature the new washer of the Northern Illinois Coal Corporation handling coal from its Wilmington strip operations. Feed to the washing plant, rated at 435 tons per hour, consists of 3x0-in. raw coal and crushed pickings from the plus 3-in. sizes. Cleaning is done in a two-launder coarse-coal washer supplemented by a fine-coal unit for recleaning the $\frac{1}{4}$x0-in. size. Two Carpenter AR-4 centrifugal dryers are installed for preliminary dewatering operations on the minus $\frac{1}{4}$-in. size, which then goes to a 7x45-ft. Christie heat dryer for completion of the drying operation. A D.L.O. heat dryer is installed for dewatering No. 4 nut ($\frac{3}{4}$x$\frac{1}{4}$-in.). Screening and mixing equipment is provided for making five primary sizes and combinations, including combinations with plus 3-in. sizes. Storage bins are provided for the $\frac{3}{4}$x$\frac{1}{4}$- and minus $\frac{1}{4}$-in. sizes, in addition to two truck-loading bins and a rotary car dumper for handling incoming raw coal.

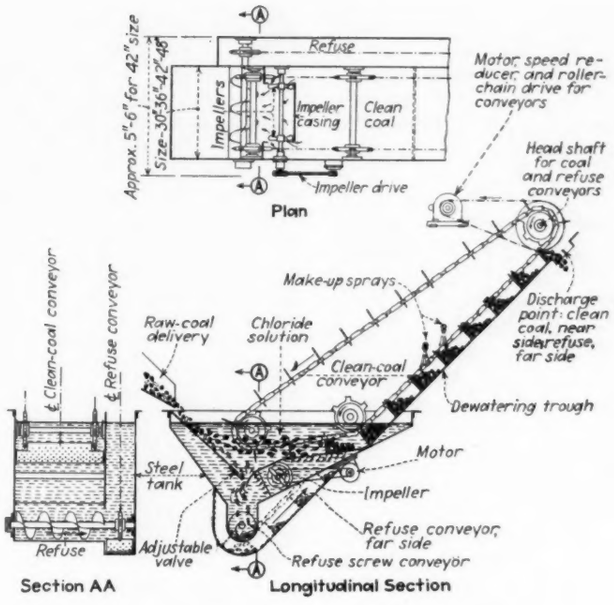

Fig. 1—Construction details, chloride washer

Heat Drying Licks Freezing

At the Farmington preparation plant of the Midland Electric Coal Corporation, two Bixby heat dryers are handling $\frac{1}{2}$x0-in. washed coal at the rate of 140 tons per hour, removing 10 to 12 per per cent of surface moisture. When combined with larger sizes from which the surface moisture has not been removed, it has been possible to ship the combined product to the Northwest with no danger of freezing, the company reports. Each dryer consists of a vertical drum in which are mounted a number of decks upon which the coal is spread, starting at the top of the dryer. Two bearings, both outside the dryer proper at the top and bottom, are provided for each unit. Cradled, pear-shaped sectors make up the various decks, which are designed to insure automatic redistribution upon each succeeding deck so that all surfaces of the coal are exposed to the drying gases, which are supplied by a stoker-fired furnace.

Wet feed is supplied to the dryer from a surge hopper on the top. Electric eyes are installed in this hopper to keep the speed of the dryer in step with any variance in the feed. Incoming gases at 700 to 900 deg. F. are introduced at the top and under the influence of an exhaust fan follow the coal down from deck to deck to the outlet at the bottom. In this manner, the company reports, gas temperature automatically is reduced as the moisture is removed from the coal to an outgoing temperature of 100 to 125 deg., thus insuring removal of all the moisture without devolatilizing or coking the coal. The furnaces are fired 24 hours per day, although drying is done for only seven hours, as this has been found to be more economical and easier on the furnace walls than kindling every day. Coal consumption per 24-hour period is 6 to 8 tons.

Separation by breakage supplements the work of jigs and air cleaners at the new Talleydale preparation plant of the Snow Hill Coal Corporation, north of Terre Haute, Ind. Rated at 500 tons per hour, the Talleydale plant includes a Bradford breaker, six Vissac jigs (including two for the Bradford breaker product), four air-flow cleaners and two Algar dedusters. Primary sizes are: 6x2-in., 2x$1\frac{1}{4}$-in., $1\frac{1}{4}$x$\frac{3}{4}$-in., $\frac{3}{4}$x$\frac{3}{8}$-in. and $\frac{3}{8}$-in. x 48 mesh. The air-flow units and dedusters will operate on the $\frac{3}{8}$x0-in. raw fraction. Other sizes will be run to separate Vissac jigs.

Dedusters Go In in Illinois

The Rex Coal Co. also installed dedusting equipment at its Eldorado (Ill.) operation in 1935. Potential capacity of the installation is 700 tons per day, and it is designed to remove minus 28-mesh dust from raw screenings prior to loading.

Construction was completed or contracts let for mechanical-cleaning installations at thirteen southern West Virginia operations in 1935, the projects

ranging all the way from individual cleaning units for one specific size to complete plants for handling the entire output of the mine. The Amherst Coal Co. installed a new preparation plant with a capacity of 300 tons per hour to serve its No. 1 and No. 2 mines, discontinuing operations at its old No. 1 tipple. Equipment includes automatic jig washers with a capacity of 200 tons per hour. Buckeye Coal & Coke Co. put in service a chloride washer with a capacity of 30 tons of stove and nut per hour, while the Elkhorn Piney Coal Mining Co. installed two such units for nut and stove, respectively, each with a capacity of 40 tons per hour.

The Island Creek Coal Co. came into the mechanical-cleaning ranks with the letting of contracts in December for three plants, each rated at 500 tons per hour, for its Nos. 14, 20 and 22 mines. Washing will be done in air-operated jigs. The Logan County Coal Corporation placed in operation a dry cleaner for 3x½-in. coal designed primarily for cleaning egg and nut with sufficient flexibility to permit preparation of either a gas or domestic coal, reducing the ash and sulphur content of the slack to meet exacting industrial fuel requirements, maintaining uniform quality, shipping the various products dry, improving sizing of the smaller grades and obtaining greater flexibility in changing and mixing grades to meet variations in market requirements. Equipment includes two three-compartment air-sand cleaners, one of which handles 3x1¼-in. nut and small egg and the other the 1¼x¼-in. portion of the 1¼-in. slack. The ¼-in. fraction, which is comparatively low in ash, sulphur and moisture, is bypassed around the cleaner and then recombined with the cleaned product or shipped separately, as desired.

West Virginia Installs Cleaners

The New River Co. installed two automatic jig washing plants for nut coal in 1935, and the New River & Pocahontas Consolidated Coal & Coke Co. added another air-operated jig plant to its list of washeries. Raleigh Coal & Coke Co. purchased a 150-tons-per-hour washing plant for 3x1¼-in. coal, employing a three-cell Baum-type washer. Airflow cleaning and dedusting plants were installed by the Sycamore Coal Co. (⅜x0-in. coal) and the Winding Gulf Collieries (½x0-in. coal).

Developments in southern West Virginia also featured considerable activity in the construction of river-loading plants. The Kanawha & Hocking Coal & Coke Co., for example, installed at Harewood a feeder, screens, three picking tables and a belt system to the river. Capacity of the installation is 600 tons per hour. Winifrede Collieries built a river-loading plant at Winifrede Junction equipped with a track hopper, feeder, crusher and belt conveyor with boom end for barge loading. Capacity is 200 tons per hour.

Pennsylvania in 1935 afforded another of the many examples in which modernization of preparation was reflected in a distinct market advantage. The McKeesport Coal & Coke Co. modernized its preparation plant with air-operated jigs and screens to wash and size ½-, 1-, 1¼- and 2-in. slack, ½x1¼-in. stoker, 1¼x2-in. nut and 2x4-in. egg. Sizes over 4 in. are hand-picked and all grades are boom-loaded. A greatly broadened market is reported by the company. Western Pennsylvania also offered an example of the modern type of preparation plant based on hand-picking and screening. This plant, now under construction at the Wyano operation of the Youghiogheny & Ohio Coal Co., is rated at 500 tons per hour and is equipped to load five sizes simultaneously, four over loading booms. Shaker screens are supplemented by a vibrator screen for pea, and complete crushing, remixing and recirculating facilities are included.

Developments in the cleaning of ultra fine sizes were featured by the installation of twelve Denver Equipment Co. flotation cells by the Pittsburgh Coal Co. for material consisting of 80 per cent minus 200-mesh. Pittsburgh Coal Co. also installed a dedusting and screening plant with a capacity of 150 tons of ⅜x0-in. coal at Imperial. Equipment includes Birtley dedusters, vibrating screens and auxiliary conveying and bin equipment to produce ⅜-in. x 10-mesh, 10x48-mesh and 48-mesh x 0 sizes and combinations. Hydroseparator equipments for washing 5x1¼-in. material were installed by the Heisley Coal Co. and the Monroe Coal Mining Co., and for 3x½-in. material by the Westmoreland Coal Co.

Western Pennsylvania also offered an outstanding example of the conversion of bituminous coal fines into a smokeless fuel. In 1935, the Pittsburgh Coal Carbonization Co. put into operation the second of its commercial units producing Disco—a smokeless, solid lump fuel for household use made by the partial distillation at a low temperature of fine coal produced as a byproduct at the Champion No. 1 preparation plant of the Pittsburgh Coal Co.

"Disco," the company reports, "can best be described as bituminous coal

New Preparation Facilities in 1935*

Coal Company	Plant Location	Capacity Net Tons per Hour	Preparation Equipment
American Briquet Co.	Lykens, Pa.	60	Wilmot[1]
Amherst Coal Co.	Amherstdale, W. Va.	300	Pittsburgh C. W.[2]
Arkwright Coal Co.	Morgantown, W. Va.	150	Fairmont[3]
Bair-Collins Co.	Roundup, Mont.	60	Link-Belt
Binkley Mining Co.	Seeleyville, Ind.	300	McNally-Pittsburg
Black Diamond Coal Mining Co.	Whitwell, Tenn.	10	Deister Concentrator[4]
Blackfoot Coal Co.	Oakland City, Ind.	400	Link-Belt
Brownsville Coal & Coke Co.	Brownsville, Pa.	200	Fairmont
Buckeye Coal & Coke Co.	Freeman, W. Va.	30	Fuel Process[5]
Carrolltown Coal Co.	St. Benedict, Pa.	325	Fairmont
Carter Coal Co.	Coalwood, W. Va.	250	Jeffrey
Central Service Co.	Des Moines, Iowa	50	Link-Belt
Centralia Collieries Co.	Centralia, Pa.	50	Wilmot[1]
Christian Colliery Co.	Mahan, W. Va.	250	Kanawha
Conoway Coal Co.	Tazewell, Va.	125	Morrow
Cottonwood Coal Co.	Giffen, Mont.	400	McNally-Pittsburg
Creech Coal Co.	Twila, Ky.	150	Link-Belt
Crummies Creek Coal Co.	Crummies, Ky.	175	Morrow
Delta Coal Mining Co.	Carrier Mills, Ill.	250	Link-Belt[6]
Dixport Coal Co.	Cinco, Ky.	125	Link-Belt
Drifted Anthracite Coal Co.	Bowmanstown, Pa.	24	Deister Concentrator[4]
Elk Horn Coal Corporation	Wayland, Ky.	250	Fairmont
Elkhorn Piney Coal Mining Co.	Stanaford, W. Va.	80	Fuel Process[5]
Franklin County Coal Co., Inc.	Herrin, Ill.	105	Link-Belt
Gauley Mountain Coal Co.	Jodie, W. Va.	100	Kanawha
Glen Alden Coal Co.	Nanticoke, Pa.	250	Koppers-Rheolaveur[7]
Gunton Coal Co.	Bernice, Pa.	75	Wilmot[8]
Hanna Coal Co.	Piney Fork, Ohio	300	Jeffrey
	Willow Grove, Ohio	360	Link-Belt[6]
Harst Coal Co.	Lowesville, W. Va.	150	Fairmont
Harvey Coal Corporation	Harveyton, Ky.	300	Jeffrey
Heisley Coal Co.	Nanty-Glo, Pa.	100	Roberts & Schaefer[9]
	Nanty-Glo, Pa.	300	Roberts & Schaefer[10]
Island Creek Coal Co.	Whitmans, W. Va.	500	Link-Belt[6]
	Whitmans, W. Va.	500	Link-Belt[6]
Jacobs Fork Pocahontas Coal Co.	Holden, W. Va.	500	Link-Belt[6]
	Crafts, W. Va.	150	Jeffrey
Jamison Coal & Coke Co.	Greensburg, Pa.	125	Robins
	Pleasant Unity, Pa.	300	Fairmont
	Farmington, W. Va.	280	Fairmont
	Farmington, W. Va.	400	Fairmont
Jonathan Coal Mining Co.	Deibler, Pa.	6	Deister Concentrator[4]
Kanawha & Hocking Coal & Coke Co.	Harewood, W. Va.	600	Kanawha
Kentucky-Jellico Coal Co.	Kayjay, Ky.	70	Roberts & Schaefer[10]
Lehigh Navigation Coal Co.	Tamaqua, Pa.	400	Chance[11]
Lehigh Valley Coal Co.	Hazleton, Pa.	120	Wilmot[1]
Lilley Mining Co.	West Brownsville, Pa.	300	Robins
Logan Coal Co.	Beaverdale, Pa.	150	Link-Belt
Logan County Coal Corporation	Lundale, W. Va.	300	Stephens-Adamson[12]
McLaren Coal Co.	Carterville, Ill.	200	Link-Belt
Minden Coal Co.	St. David, Ill.	450	Link-Belt[6]
Mine "B" Coal Co.	Springfield, Ill.	300	Jeffrey
Moffat Coal Co.	Minooka, Pa.	100	Koppers-Rheolaveur[7]
Monongahela Rail & River Coal Corporation	Maidsville, W. Va.	250	Roberts & Schaefer
Monroe Coal Mining Co.	Revloc, Pa.	100	Roberts & Schaefer[9]
New River Co.	Macdonald, W. Va.	250	Pittsburgh C. W.
	Macdonald, W. Va.	70	Pittsburgh C. W.[2]
New River & Pocahontas Consolidated Coal & Coke Co.	Skelton, W. Va.	75	Pittsburgh C. W.[2]
	Summerlee, W. Va.	350	Pittsburgh C. W.
	Newhall, W. Va.	75	Link-Belt[8]

with the smoke taken out. It has been demonstrated in full-sized oven and furnace tests that Disco has all the properties of low-volatile or so-called 'smokeless' coal in a blend for ovens making coke for iron furnaces. The product is generally of a rounded, spherical shape and is marketed in one size, approximately the run-of-retort output passing over a 1-in. screen. As now produced Disco contains between 16 and 17 per cent volatile matter and by comparison with other fuels is very reactive in combustion. The fuel is dense and under the standard shatter test is as strong as average coke. Boiler tests have shown that Disco burns with practically the same efficiency as coke, requires less draft, ignites more easily than coke, and in laboratory tests has been banked for five days. It is not uncommon for householders to bank the fire for two or three days and start it up again without kindling at the end of that time. Because of these peculiar and important qualities, Disco has found great favor with householders in furnaces of all types. As a fuel for fireplaces, Disco is in a class by itself. Here the ease of kindling, the exceptional amount of radiant heat given off and the long life of the fire have made it popular in the living-room fireplace as well as in the furnace in the basement.

"The first commercial Disco-producing unit was completed and put in operation in November, 1933. The retort on this unit is 6 ft. in diameter and 90 ft. long. The second unit, of which the retort is 8 ft. in diameter and 110 ft. long, was put into operation in November, 1935. The third unit, of which the retort is 8 ft. in diameter and 130 ft. long, will be in operation some time during February, 1936. The process used is that covered by the Wisner patents as modified and developed by the Pittsburgh Coal Carbonization Co. The raw material fed to these retorts is the dust and very fine coal from Champion No. 1 cleaning plant of the Pittsburgh Coal Co., after cleaning by oil flotation.

"The main features of the Disco plant are storage bins at the head of each unit from which a constant, continuous 24-hours-per-day, 7-days-per-week feed is maintained to the pretreatment stage of the operation. The preliminary heating and pretreating are accomplished in a predetermined definite manner to so prepare the feed for the retort that a product of proper size and density is obtained. The feed is delivered to the retort at approximately 550 deg. F., and at this stage the material is still in the same form as the raw feed—that is to say, dust. In the retort partial distillation is accomplished at a maximum temperature of not over 900 deg. F., and the product is obtained in a continuous stream of rounded lumps ranging in size from ½ in. to a pretermined maximum size, usually six or seven inches.

"Gases obtained in this distillation are cooled to separate out the tar and are then used in so far as may be required to maintain the proper heat in the process as a whole. The product obtained for market in solid form represents in excess of 75 per cent of the dry weight of the raw feed. Depending upon the character of the raw feed, the tar yield ranges from 16 to 20 gal. per ton of product, and is stored, stilled, refined and variously prepared for market by the Pittsburgh Coal Carbonization Co., largely as road tar, at a location immediately adjacent to the Disco plant."

In Ohio, as a preliminary to mechanization of loading, the Hanna Coal Co. began the construction of a washing and sizing plant at its Willow Grove No. 10 mine, thus adding another to the lengthening list of operations where mechanical cleaning facilities have been installed on the surface to supplement mechanical loading underground. In the Southwest, the Pittsburg & Midway Coal Mining Co. continued developments at its West Mineral central cleaning plant, adding a coal-washing table for ⅛-in. x 35-mesh material to the differential density cones, air-operated-jig equipment, Denver flotation cells and filters and D.L.O. drying equipment already in service.

New Preparation Facilities in 1935*

Coal Company	Plant Location	Capacity Net Tons per Hour	Preparation Equipment
North-East Coal Co.	Thealka, Ky.	150	Fairmont
Northern Illinois Coal Corporation	Wilmington, Ill.	435	Koppers-Rheolaveur[13]
Northwestern Improvement Co.	Roslyn, Wash.	50	American[14]
Page Pocahontas Coal Co.	Grundy, Va.	400	Jeffrey
Peabody Coal Co.	West Frankfort, Ill.	500	Link-Belt[6]
Pennsylvania Coal & Coke Corporation	Arcadia, Pa.	150	Robins
	Barnesboro, Pa.	200	Robins
	Nanty-Glo, Pa.	150	Robins
Pine Hill Coal Co.	Minersville, Pa.	20	Wilmot[1]
Pittsburg & Midway Coal Mining Co.	West Mineral, Kan.	15	Deister Concentrator[4]
Pittsburgh Coal Co.	Imperial, Pa.	150	Koppers-Rheolaveur[15]
	Pittsburgh, Pa.	150	Morrow
	Pittsburgh, Pa.	100	Link-Belt[6]
Pocahontas Fuel Co.	Pocahontas, Va.	150	Link-Belt
Pyramid Coal Corporation	Pinckneyville, Ill.	450	Link-Belt
Raleigh Coal & Coke Co.	Raleigh, W. Va.	150	Jeffrey[16]
Reading Iron Co.	Stoyestown, Pa.	125	Link-Belt
Red Jacket, Jr., Coal Co.	Wyoming, W. Va.	300	Morrow
Ridgeview Coal Co.	Ridgeview, W. Va.	125	Kanawha
Robert Gage Coal Co.	Unionville, Mich	250	Link-Belt
Roslyn-Cascade Coal Co.	Roslyn, Wash.	100	McNally-Pittsburg[17]
Sahara Coal Co.	Harrisburg, Ill.	825	McNally-Pittsburg[17]
Sandy Run Miners' & Producers' Co.	Sandy Run, Pa.	110	Wilmot[18]
Scotia Coal & Coke Co.	Brooklyn, W. Va.	150	Kanawha
Seneca Coal & Coke Co.	Broken Arrow, Okla.	300	McNally-Pittsburg
Sherwood-Templeton Coal Co.	Dugger, Ind.	250	Link-Belt
Shuler Coal Co.	Waukee, Iowa	50	Link-Belt
Snow Hill Coal Corporation	Talleydale, Ind.	500	Allen & Garcia[19]
Springfield Coal Corporation	Nanty-Glo, Pa.	400	Fairmont
St. Clair Coal Co.	St. Clair, Pa.	32	Deister Concentrator[20]
Sullivan Trail Coal Co.	Pittston, Pa.	150	Koppers-Rheolaveur[7]
Sunlight Coal Co.	Boonville, Ind.	500	Marion S.S. Co.[21]
Sycamore Coal Co.	Cinderella, W. Va.	100	Roberts & Schaefer[10]
Tierney Mining Co.	Stone, Ky.	250	Link-Belt
Truax-Traer Coal Co.	Fiatt, Ill.	350	Morrow
Union Coal Co.	Peru, Ill.	90	Link-Belt
United States Coal & Coke Co.	Lynch, Ky.	...	Stephens-Adamson
Virginia Iron, Coal & Coke Co.	St. Charles, Va.	200	Link-Belt
West Virginia Coal & Coke Corporation	Omar, W. Va.	500	Link-Belt
Westmoreland Coal Co.	Irwin, Pa.	150	Roberts & Schaefer[22]
Weyanoke Coal & Coke Co.	Arista, W. Va.	300	Link-Belt
Winding Gulf Collieries	Goodwill, W. Va.	100	Roberts & Schaefer[10]
Winifrede Collieries	Winifrede, W. Va.	200	Kanawha
Wolfe Collieries Co.	Oneida, Pa.	200	Wilmot[18]
Youghiogheny & Ohio Coal Co.	Wyano, Pa.	500	Fairmont

*Also includes rebuilt plants and major installations of preparation equipment in existing structures.

[1]Including Hydrotator equipment. [2]Including Llewellyn jigs. [3]Additional capacity resulting from reconstruction; original capacity, 200 tons per hour. [4]Deister-Overstrom "Diagonal-Deck" coal-washing tables. [5]Chloride washers; built by Kanawha Mfg. Co.

[6]Including Link-Belt-Simon-Carves coal-washing equipment. [7]Including Menzies cone separators. [8]Complete jig breaker. [9]Including Menzies hydroseparators. [10]Including Stump air-flow coal cleaners.

[11]Including Chance sand-flotation equipment. [12]Including air-sand cleaning equipment. [13]Including Rheolaveur coal-washing equipment. [14]American penumatic separator and metallic dust-collecting system. [15]Birtley dedusting units and auxiliaries.

[16]Including Jeffrey Baum-type coal-washing jig. [17]Including McNally-Norton automatic coal-washing equipment. [18]Including Simplex jigs and Hydrotator coal-washing equipment. [19]Including Vissac jigs and Stump air-flow coal cleaners. [20]Cleaned-coal output; Deister-Overstrom "Diagonal-Deck" coal-washing tables.

[21]Including McNally-Norton automatic coal-washing equipment with a capacity of 200 tons per hour. [22]Additional capacity; installation includes Menzies hydroseparators.

Washington Adds to Facilities

Washington, where mechanical cleaning won a place a number of years ago, added to facilities in 1935. Included in the 1935 projects was a central cleaning plant with a capacity of 150 tons per hour to serve the four mines of the Northwestern Improvement Co. in the Roslyn field. In addition to wet-washing equipment, the plant includes a pneumatic separator and metallic dust-collecting system for ⅜x0-in. material. Another Roslyn operation, the Roslyn Cascade Coal Co., installed an air-operated jig washer with a capacity of 100 tons per hour for 2-in. screenings.

Reconstruction of existing plants, equally with construction of new plants, exemplified in 1935 the trend toward installation of screening facilities for more efficient sizing or the production of additional sizes, crushing and mixing equipment for greater flexibility of operation, new loading facilities, dust-

less-treating equipment, etc., as well as measures for reducing degradation in preparation and in shipments. The importance of these changes in a number of instances may be judged by the expenditures involved. The Peabody Coal Co., for example, made improvements in its No. 57 mine tipple at Springfield, Ill., involving an outlay of $100,000. The project included installation of new retail coal bins. Peabody also is listed in the ranks of Illinois companies adding to mechanical-cleaning facilities in 1935 through the completion of a complete wet-and-dry plant at Duquoin with a capacity of approximately 200 tons per hour and the construction of a washing plant at its No. 7 mine, Kincaid, equipped with air-operated jig facilities with a capacity of 125 tons per hour. Other reconstruction projects in the Springfield district in 1935 included: Panther Creek Mines, Inc., which added new screens, rescreens and loading booms to its New North tipple for making additional sizes, and the Mine "B" Coal Co., which added a loading boom and picking tables.

Indiana Improves Preparation

In Indiana, the Knox Consolidated Coal Corporation concluded a program of improvements at its No. 1 tipple involving the installation of picking tables and fitting it for the shipment of 22 separate grades of coal. Equipment included a Bradford breaker with 10-in. perforations. Coal from the breaker is hand-picked and pickings are put through an additional breaker with 1½-in. perforations. The product of this latter breaker is shipped to the preparation plant at the No. 2 mine for treatment in an air-sand cleaner, which also handles material from a similar breaker at that plant. Bean chemical spraying equipment was added to the facilities at the No. 2 plant in 1935.

In the South the Tennessee Consolidated Coal Co., Tracy City, Tenn., installed screening and tipple facilities for loading five grades of coal at one time over loading booms. Kentucky companies carrying out programs of addition or reconstruction in 1935 included: Glogora Coal Co., vibrating screens at its Glo tipple; Dawson Daylight Coal Co., vibrator for making stoker size; and the Harvey Coal Corporation, reconstruction of the Harveyton tipple. The Harveyton project involved replacement of old shaker screens, picking tables and loading booms with new screening, crushing, loading, mixing, recirculating and house-coal facilities mounted on separate steel foundations but fitted into the existing tipple structure. The new balanced primary shaking screens have a normal rating of 300 tons per hour plus a recirculated load of crushed coal of 125 tons per hour. Four loading tracks are provided, with picking tables and booms for nut, egg and block. A feature of the preparation facilities is the installation of special rescreening equipment, designed by the company, at the end of the egg and block tables to remove degradation as the coal is discharged onto the loading booms. Electrical control is of the pushbutton-sequence-starting type, enabling one man to control all the machinery or a preselected number of units and insuring the starting of all units in proper sequence without the possibility of any unit being operated incorrectly. Approximate cost of the project was $40,000 and it gives the company facilities modern in every respect.

One of the several West Virginia reconstruction programs was that of the Johnstown Coal & Coke Co., which added a rotary dump, conveyors and screens to its Crichton (W. Va.) mine at a cost of $20,000. Further improvements are contemplated in 1936. In northern West Virginia, the Virginia & Pittsburgh Coal & Coke Co. was in process of adding equipment to its Kingmont tipple at the end of the year to permit the shipment of an additional size on a fourth track, the work being handled by the Helmick Foundry-Machine Co.

As originally constructed, the Kingmont tipple was designed for the shipment of various sizes of lump, egg or nut and slack on three tracks. Two vibrating screens operating in tandem are now being installed over the slack track. These screens are fitted with wire cloth with a ⅜-in. square mesh, and will receive the undersize from a primary screen fitted with lip sections to make, depending upon the size of opening, ⅜-, ¾-, ⅞-, 1¼-, 2-, 3⅜- or 3½-in. slack. Present plans, however, call for rescreening only four of these products to make ⅜x¾-, ⅜x⅞-, ⅜x1¼- or ⅜x2-in. sizes, plus ⅜-in. slack. Bypass equipment will be installed at the end of the vibrators to provide for running alternately slack or prepared sizes to the present slack track or to a belt-conveyor installation leading to a fourth track 82 ft. away from the slack track.

Far West Revamps Plants

Reconstruction activities in the Rocky Mountain fields paralleled substantially those in fields to the east. In Colorado, the Colorado Fuel & Iron Co. added to its Salida screening plant rescreens and loading facilities for preparing and loading egg and nut separately in box cars. At the Delagua property of the Victor-American Fuel Co., in Las Animas County, the South tipple was equipped with a picking table and two belt conveyors 30 in. wide and 85 ft. long between centers to permit mixing the products of all the Delagua mines. Utah reports many additional crusher installations—lump to smaller sizes—growing out of increased consumption of stoker sizes in household equipment, as well as loss of lump business to gas.

One striking development in bituminous preparation in 1935 was the sharp increase in installation of dustless-treating equipment at the mines, in contradistinction to the previous trend to treatment at retail yards. Oil treatment was adopted by an increasing number of operators, as, for example, in Utah, where many installations followed the pioneer offering of "Duspruf" stoker slack by the Utah Fuel Co., using the Viking hot-vapor process. Under this process, cold oil is pumped from a storage tank to heating units (steam or electric) near the point of application. Normally, the nozzles are placed at the ends of screens, chutes or booms, where the coal can be sprayed while turning over in the air. In one or two instances, however, hoods have been placed over loading booms in which the nozzles are mounted so that the oil spray is directed down on the coal on the boom. Hoods also are employed where nozzles are installed at the ends of loading booms to minimize loss of oil.

Dustless Treatment Up in Illinois

In Illinois, where the process was pioneered by the Franklin County Coal Corporation, additional installations were made by the Sahara Coal Co. and Wasson Coal Co., among others. The Old Ben Coal Corporation increased oil-treating facilities of its own design at its Nos. 8 and 14 mines. Old Ben also started the trademarking of its coal and installed green-marking equipment of its own design at its Nos. 14 and 15 mines. Additional units for other mines are contemplated in the future. Installation of oil- or chemical-spraying equipment also was a feature of developments in Indiana, Kentucky (including hot-vapor installations by the Blue Diamond Coal Co. and the Dawson Daylight Coal Co. —all sizes on all tracks), Maryland, Michigan, West Virginia and other Eastern and Southern states.

The 1935 record of preparation construction in both the anthracite and bituminous industries is summarized on p. 68. This summary was made possible through the following equipment manufacturers and designers: Allen & Garcia Co., American Coal Cleaning Corporation, Chance Coal Cleaner, Cumberland Coal Cleaning Corporation, Deister Concentrator Co., Deister Machine Co., Fairmont Machinery Co., Fuel Process Co., Heyl & Patterson, Inc., Jeffrey Mfg. Co., Kanawha Mfg. Co., Koppers-Rheolaveur Co., Link-Belt Co., McNally-Pittsburg Mfg. Corporation, Morrow Mfg. Co., Pittsburgh Coal Washer Co., Roberts & Schaefer Co., Robins Conveying Belt Co., Stephens-Adamson Mfg. Co., United Iron Works Co. and the Wilmot Engineering Co.

WAGE INCREASE

+ High Spot in Bituminous Labor Relations

CONTRACTUAL relations between bituminous operators and their employees in 1935 were featured by an increase in wage rates on Oct. 1 and an attempt to lay the differential questions which have plagued the industry for many years. The stage was set for these developments when the joint conference of operators and representatives of the United Mine Workers met in Washington, D. C., Feb. 18, to negotiate a new Appalachian agreement to replace the existing contract expiring March 31. Miners brought to the conference demands for a 6-hour day and a 5-day week and wage increases as follows: cutting and loading, 15c., divided 13c. to loaders and 2c. to cutters; inside and outside day rates, 50c., with corresponding increases in monthly scales; pick mining, 25c. per ton; yardage and deadwork rates, 20 per cent, with corresponding increases in rates on conveyors and mechanical loaders. Operators countered with a proposal to extend the agreement then in effect with the addition of provisions for inclusion of any settlement of differentials which might later be arrived at, thus ringing up the curtain on a long series of extensions to prevent a cessation of operations while conferees wrestled with the contending viewpoints of the operator and miner groups or marked time while awaiting passage of the Guffey-Snyder Act.

Agreement Ends Extensions

Five extensions were granted before the conference, after a last hard-fought battle over the extent of the increases in wage rates, finally got together on Sept. 27. Terms of the new Appalachian agreement, which expires March 31, 1937, represented a compromise on each side. No changes were made in working schedules, and the wage increases asked by the union were scaled down to the following: day wages, 50c., with 70c. to miners on mechanical loading and conveying equipment; shortwall cutting and loading rates and pick-mining rates, 9c. per ton; yardage and deadwork rates, 10 per cent, except in the case of rates in connection with mechanical mining, to be increased in the same proportion as the basic cutting and loading rates. New and old basic rates for day work, loading after machines, pick mining and cutting are compared, as far as available, in Tables I and II.

Harlan, Hazard, Virginia and Southern Appalachian operators refused to sign with the other Appalachian fields, although Hazard and Virginia capitulated shortly after, at the same time registering a protest against the differentials accorded them. Harlan operators, with a few exceptions, continued their standing refusal to enter into contractual relations, and Southern Appalachian companies held out for several weeks, finally signing up after the terms of the agreement had been accepted by operators in southern Tennessee. Western Kentucky operators, with some few exceptions, also continued their refusal to accept a union contract.

Alabama Gets Concession

Increases granted in the Appalachian agreement also were applied in other fields of the country, although difficulties were encountered in some over other contract provisions. One exception to the list of fields granting the raises was Alabama, where, after an eight-weeks' deadlock, a compromise agreement carrying the following increases was granted: day rates, 20c.; tonnage rates, 4½c.; yardage and deadwork rates, 5 per cent. Following the Alabama agreement, the Southern Appalachian and Hazard districts took steps to secure an adjustment in accordance with terms of their respective district contracts with the miners' union.

While the new Appalachian agreement laid the groundwork for a settlement of the North-South differential question, the subscale committee set up to consider the question voted on Oct. 11 to postpone action and referred the problem back to the full joint conference scheduled to meet Feb. 17, 1937. Reasons were lack of time for adequate investigation and determination. The subscale committee did, however, outline the procedure to be followed in handling other inter- and intradistrict differential questions, and agreed upon the following cutting and loading rates as bases for the four major Appalachian divisions: (1) Pittsburgh thin-vein shortwall cutting and loading rates for the Northern high-volatile area; (2) central Pennsylvania basic shortwall cutting and loading rates for the Northern low-volatile field; (3) Kanawha basic shortwall cutting and loading rates for the Southern high-volatile fields; and (4) New River basic shortwall cutting and loading rates for the Southern low-volatile fields.

Illinois Struggle Continues

The Progressive Miners of America continued its efforts to wrest control of the mine works in Illinois from the United Mine Workers of America, without, however, any appreciable gains and in fact some losses to the regular organization. As in past years, the struggle between the two unions was marked by considerable violence and property damage.

Table I—Comparative Basic Inside and Outside Day Scales Provided in Old and New Union Contracts

(Union districts corresponding to the various fields are given in parentheses)

	Inside		Outside	
	Old	New	Old	New
Alabama (20)	$3.80	$4.00	$2.80	$3.00
So. Tennessee (19)	4.24	4.74	3.28	3.78
Southern high- and low-volatile, including Maryland-Upper Potomac (30, 28, 19, 17, 16)	4.60	5.10	3.60	4.10
Northern West Virginia, Pennsylvania, Ohio W. Va. Panhandle (31, 2, 3, 4, 5, 6)	5.00	5.50	4.00	4.50
Michigan (24)	5.00	5.50	4.58	5.08
Indiana (8, 11)	4.57½	5.07½	4.20	4.70
Illinois (U. M. W. 12; P. M. A. I)	5.00	5.50	4.00	4.50
Iowa (13)	4.70	5.20	4.00	4.50
Kansas-Missouri (14)	4.00	4.50	3.53	4.03
Arkansas-Oklahoma (14)	4.00	4.50	3.53	4.03
So. Colorado-New Mexico (15)	5.10	5.60	4.10	4.60
Northern Colorado (15)	5.25	5.75	4.25	4.75
Southern Wyoming (22)	5.42	5.92	4.44	4.94
Northern Wyoming (22)	5.42	5.92	4.54	5.04
Utah (22)	5.44	5.94	4.48	4.98
Montana (27)	5.63	6.13	4.82	5.32
Washington	5.40	5.90	4.10	4.60

Table II—Comparative Tonnage Rates Under Old and New Union Agreements*

(Union districts corresponding to the various fields are given in parentheses)

	Loading Machine-Cut Coal		Pick Mining		Cutting, Shortwall Machine	
	Old	New	Old	New	Old	New
Alabama (20)						
Coal 26 in. and under	$0.71	$0.75	$1.02	$1.06½	$0.11	$0.11½
26-32 in.	0.65½	0.69½	0.87½	0.92	0.10	0.10½
32-48 in.	0.60	0.64	0.82	0.86½	0.08¼	0.08½
48-72 in.	0.54	0.58	0.76	0.80½	0.06	0.06½
72-96 in.	0.54	0.58	0.67½	0.72	0.06	0.06½
Over 96 in.	0.54	0.58	0.65	0.69½	0.06	0.06½
Southern Appalachian (19)						
Coal 30-33 in.	0.58	0.66	0.68	0.76	0.095	0.105
33-36 in.	0.54	0.62	0.64	0.72	0.092	0.102
36-42 in.	0.51	0.59	0.61	0.69	0.09	0.100
42-48 in.	0.48	0.56	0.58	0.66	0.088	0.098
48 in. and over	0.45	0.53	0.55	0.63	0.085	0.095
Harlan (19)						
Coal 28-36 in.	0.52	0.60	0.61	0.70	0.09	0.10
36-44 in.	0.49	0.57	0.57	0.66	0.08	0.09
44-52 in.	0.46	0.54	0.53	0.62	0.07	0.08
52 in. and over	0.43	0.51	0.49	0.58	0.06	0.07
Hazard (30)	0.482	0.562	0.572	0.662	0.09	0.10
Big Sandy-Elkhorn (30)						
Coal under 4 ft.	0.545	0.625	0.635	0.725	0.09	0.10
Over 4 ft.	0.500	0.580	0.59	0.68	0.09	0.10
Virginia (28)						
Coal 42 in. and under	0.51	0.59	0.587	0.677	0.077	0.087
42-48 in.	0.49	0.57	0.567	0.657	0.077	0.087
Over 48 in.	0.47	0.56	0.547	0.637	0.077	0.087
Kanawha (17)	0.502	0.582	0.582	0.672	0.08	0.09
Logan (17)						
Coal under 48 in.	0.444	0.524	0.506	0.596	0.062	0.072
48 in. and over	0.404	0.484	0.466	0.556	0.062	0.072
Williamson (17)						
Coal under 48 in.	0.462	0.542	0.528	0.618	0.066	0.076
48 in. and over	0.422	0.502	0.488	0.578	0.066	0.076
Greenbrier (17)	0.472	0.552	0.537	0.627	0.065	0.075
New River (17)	0.522	0.602	0.607	0.697	0.085	0.095
Pocahontas-Tug River (17)	0.437	0.517	.....	....	0.055	0.065
Winding Gulf (17)	0.464	0.544	0.544	0.634	0.08	0.09
Maryland-Upper Potomac (16)						
Bakerstown seam	0.65	0.73	0.78	0.87	0.09	0.10
Waynesburg seam	0.60	0.68	0.78	0.87	0.09	0.10
Other seams	0.53	0.61	0.722	0.812	0.09	0.10
Ohio-West Virginia Panhandle (6)						
Hocking	0.60	0.68	0.80	0.89	0.09	0.10
Coshocton-Massillon	0.625	0.705	0.90	0.99	0.10	0.11
Salem:						
Coal under 3 ft.	....	....	1.03	1.12	....	....
3-3[1] ft.	0.65	0.73	....	....	0.13	0.14
Over 3 ft.	....	....	0.98	1.07	....	....
Over 3½ ft.	0.635	0.715	....	....	0.13	0.14
Columbiana:						
Coal 3-4 ft.	....	....	....	....	0.115	0.125
3½-3¾ ft.	0.634	0.714	0.99	1.08	....	....
3½-4 ft.	0.62	0.70	0.97	1.06	....	....
4 ft. and over	0.60	0.68	0.90	0.99	0.09	0.10
E. Ohio-No. W. Va. Panhandle	0.60	0.68	0.80	0.89	0.09	0.10
Central Pennsylvania—Somerset County (2)	0.60	0.68	0.80	0.89	0.09	0.10
Western Pennsylvania (3, 4, 5)						
Thin vein	0.60	0.68	0.80	0.89	0.09	0.10
Thick vein	0.56	0.64	0.75	0.84	0.08	0.09
Connellsville	0.48	0.56	0.66	0.75	0.07	0.08
Westmoreland-Greensburg	0.56	0.64	0.75	0.84	0.08	0.09
Thick Vein Freeport	0.56	0.64	0.75	0.84	0.08	0.09
Northern West Virginia (3)	0.505	0.585	0.66	0.75	0.075	0.085
Webster field	0.522	0.602	0.66	0.75	0.085	0.095
Michigan (24)						
Coal 21-24 in.	0.896		1.24		0.071	
24-27 in.	0.825		1.089		0.154	
27-30 in.	0.798		1.05		0.148	
30 in. and up	0.77		1.012		0.142	
Indiana (11)	0.555	0.635	0.78	0.87	0.095	0.105
Illinois (12)						
First district	0.79	0.88	0.87	0.96	....	....
	....	1.12	....	1.20	....	....
Second district	0.67	0.76	0.78	0.87	....	....
Third district	0.707	0.797	0.787	0.877	....	....
	0.74	0.83	0.82	0.91	....	....
	0.70	0.79	0.78	0.87	....	....
Fourth district	0.74	0.83	0.82	0.91	....	....
	0.79	0.88	0.87	0.96	....	....
	0.85	0.94	0.93	1.02	....	....
	0.96	1.05	1.04	1.13	....	....
Illinois (12)—Continued						
Fifth district	0.70	0.79	0.78	0.87	....	....
	0.75	0.84	0.83	0.92	....	....
Sixth district	0.66	0.75	0.74	0.83	....	....
	0.71	0.80	0.79	0.88	....	....
Seventh district	0.66	0.75	0.74	0.83	....	....
	0.79	0.88	0.87	0.96	....	....
	0.77	0.86	0.85	0.94	....	....
Eighth district	0.86	0.95	0.94	1.03	....	....
	0.99	1.08	1.07	1.16	....	....
Ninth district	0.70	0.79	0.78	0.87	....	....
	0.75	0.84	0.83	0.92	....	....
Iowa (13)						
Centerville agreement	0.91	1.00	[11]1.41	[11]1.51	0.22½	0.23
Des Moines agreement:						
Subdistrict No. 2	0.70	0.78	0.91	1.00	....	....
Subdistrict No. 3	0.715	0.795	0.935	1.025	....	....
Subdistrict No. 4	[21].03	[21]1.11¾	[21].65	[21].75	....	....
Kansas-Missouri (14)[4]	0.61	0.68	0.88	0.97	0.16	0.18
Oklahoma (14)	0.645	[5]0.72	0.85	[6]0.94	0.125	0.14
Arkansas (14)	0.645	[7]0.72	0.80	[8]0.89	0.125	[9]0.14
Southern Colorado-New Mexico (15)						
Colorado Fuel & Iron Co.[10]						
General rate	[11]0.63	[11]0.71	0.78	0.87	....	....
Coal under 4 ft.	0.59	0.67	....	....	0.126	0.136
Over 4 ft.	0.58	0.66	....	....	....	....
4-6 ft.	....	....	....	....	0.116	0.126
Under 6 ft.	....	....	....	....	[12]0.116	[12]0.126
Over 6 ft.	....	....	....	....	0.105	0.115
6-8 ft.	....	....	....	....	0.095	0.105
Under 7 ft.	....	....	0.78	0.87	....	....
7-10 ft.	....	....	0.75	0.84	....	....
Over 8 ft.	....	....	....	....	0.084	0.094
Over 10 ft.	....	....	0.72	0.81	....	....
Heavy pitch, under 5 ft.	....	....	....	....	0.158	0.168
5-6 ft.	....	....	....	....	0.148	0.158
6 ft. or over	....	....	....	....	0.137	0.147
Light pitch, under 5 ft.	....	....	....	....	0.126	0.136
5-6 ft.	....	....	....	....	0.116	0.126
6 ft. or more	....	....	....	....	0.105	0.115
Northern Colorado (15)[13]						
Louisville district	0.665	0.745	0.86	0.95	0.14	0.15
Erie-Frederick district	0.63	0.71	0.80	0.89	0.10	[14]0.11
Southern Wyoming (22)[15]						
Rock Springs district:						
Coal under 5 ft.	0.69	0.77	0.90	0.99	0.13	0.14
5 ft. or over	0.63	0.71	0.80	0.89	0.09	0.10
Kemmerer Coal Co.	....	....	0.77	0.86	....	....
Oakley "00" Vein	0.68	0.76	0.85	0.94	....	....
Glencoe, 5-6 ft. coal	0.54	0.63	0.81	0.90	....	....
Over 6 ft.	0.54	0.63	0.78	0.87	....	....
Blazon, under 5 ft. coal	....	....	0.86	0.95	....	....
5-6 ft. coal	....	....	0.81	0.90	....	....
Over 6 ft. coal	....	....	0.78	0.87	....	....
Hanna district:						
Coal 5 ft. and over and No. 2 seam	0.64	0.72	0.80	0.89	0.08	0.09
Northern Wyoming (22)						
Sheridan County	....	....	0.77	[16]	....	....
Rooms, dry	0.55	[16]	....	....	....	....
Rooms, wet	0.57	[16]	....	....	....	....
Owl Creek Coal Co.	....	....	0.86	[16]	....	....
Rooms, dry	0.55	[16]	....	....	0.11	[16]
Rooms, wet	0.57	[16]	....	....	0.11	[16]
Utah (22)						
Coal 4-5 ft.	....	....	0.79	0.88	....	....
Under 5 ft.	0.67	0.75	....	....	0.11	0.12
5 ft. and over	0.63	0.71	0.75	0.84	0.09	0.10
Montana (27)						
Bear Creek	0.68¼	0.76¼	0.926	1.016	....	....
Washington (10)						
Roslyn-Cle Elum:						
Cap rock left up	....	....	0.98	1.07	....	....
Under 6 in. taken	0.71	0.785	1.03	1.12	0.135	0.15
6-12 in.	0.73	0.80½	1.05	1.14	0.135	0.15

*As far as possible either basic or typical rates have been included in the above compilation; where rates have been separated according to class of work, rates for rooms or wide work have been used.

[1]Screened-lump or hand-picked basis. [2]Longwall work, screened-lump basis, mine-run, 10 per cent less. [3]Screened-lump basis, mine-run 10 per cent less. [4]Cherokee and Crawford Counties, Kansas; Barton County, Missouri. [5]Basic rate; some different rates apply in certain cases.

[6]Basic rate, with minor exceptions, for pick or solid-shooting work. [7]Also 76c. 86c., in addition to certain special and local rates. [8]Huntington solid-shooting rate; other solid-shooting rates applicable at specific mines, 98c., 99c.; pick rates, $0.89, $1.04, $1.08, $1.10, in addition to certain special and local rates. [9]Also 16c., 17c., 19½c., 20c. [10]Specific tonnage rates not included in general Southern Colorado-New Mexico agreement; rates given, as they may apply, are for the Morley, Frederick, Cameron, Kebler, Nonac and Crested Butte mines.

[11]Nonac only. [12]Crested Butte, 10c. and 11c. respectively. [13]Mines covered by agreement with Northern Colorado Coal Producers' Association. [14]Coal over 5 ft., low-coal rate, 11.7c. [15]Union Pacific Coal Co., Southern Wyoming agreements. [16]Copies of new agreement not available at time of compilation of table

PRODUCTIVE CAPACITY

+ Of Bituminous Coal Mines on the Upgrade

IS BITUMINOUS mine capacity increasing or decreasing? Has the steady liquidation in the number of operations and in productive capacity which started in 1923 and in ten years reduced the number of commercial mines from 9,331 to 5,427 and cut producing capacity from 970 to 653 million tons come to a halt? The answer seems to be in the affirmative.

First indications of a reversal in trend appeared in 1933 when the number of commercial operations increased to 5,555, although producing capacity still continued downward until 1934. Since that time, while many additional mines have been closed down either temporarily or permanently, new developments and the reopening of older operations have further increased productive capacity. These conclusions are borne out by a survey of changes in mine activity since Jan. 1, 1933, just completed by *Coal Age*.

While losses still are occurring in a number of fields, the survey shows that for the country as a whole, losses in capacity due to closing and abandonment of mines in the past three years have been more than exceeded by gains arising out of the opening of new mines and the resumption of operations at old mines. The survey included reports on changes in status of nearly 600 mines with a daily capacity of 50 tons or more in 21 States. The data showed that 272 operations opened or reopened since Jan. 1, 1933, adding a total of 173,875 tons to the daily producing capacity of the United States. Aggregate capacity removed from the production column through the closing or abandonment of the 312 mines reported as so affected in the survey was 158,920 tons per day. In many cases, of course, closings reported are not necessarily permanent.

Particulars by States, so far as revealed by the survey, are given in Tables I and II. The latter gives in full mines reported as opening or reopening, as well as certain mines reported by the companies themselves as closed or abandoned. Complete data on mines closed or abandoned, including the number and aggregate capacity of mines so reported, but for which no confirmation could be secured from the companies last listed as operating them, are given in Table I, which summarizes the changes in capacity by States.

Analyzing the returns by regions, a relatively high degree of stability in producing capacity is indicated in the Far West in the past three years—at least in respect to number of mines. Mixed trends prevail in the Southwest, where net losses are shown in Arkansas, Missouri and Oklahoma, while Kansas reports a substantial increase in capacity.

Illinois shows a gain in the past three years resulting from both deep- and strip-mine developments. Indiana still is behind, but a sharp increase in opening of new mines and resumption of operations at old mines in 1935 presages an early reversal of its position. With only one closing since Jan. 1, 1933, Michigan brings seven new or reopened mines with an aggregate daily capacity of 3,250 tons to the production columns.

Losses in Alabama reflect the increased competition of substitutes with the output of commercial mines as well as the slackening of activity in the Alabama steel industry. Kentucky's adverse showing mirrors the decreased participation of that State in the annual output of the country in late years, in which Tennessee also shares to some extent. In Virginia, on the other hand, the spectacular rise of the new Grundy field brought nine new mines to the producing columns of the State, thus accounting for a large part of the increase.

In Pennsylvania and West Virginia, where the swing to increasing rather than declining capacity apparently started earlier than in many other fields, substantial increases in capacity were registered in the three years since Jan. 1, 1933. Activity in both States was fairly well distributed in proportion to the outputs of the various producing regions in the two States.

The survey was made possible through the cooperation of railroads, State mine departments and secretaries of operators' associations, who supplied much of the data embodied in the two tables. Their reports were supplemented by over 850 inquiries addressed to individual operating companies to check reported changes in status.

Table I—Summary of Changes in Bituminous Producing Capacity Since Jan. 1, 1933, by States

	Opened or Reopened		Closing or Abandonment Confirmed		Closing or Abandonment Reported But Not Confirmed	
	Mines	Capacity	Mines	Capacity	Mines	Capacity
Alabama	1	1,200	6	4,850	4	1,500
Arkansas	11	2,165	1	200	17	4,930
California	..	....	..	....	1	500
Colorado	2	475	..	....	2	600
Illinois	12	16,150	3	4,275	7	9,650
Indiana	39	31,665	17	21,550	32	16,055
Iowa	1	300	1	300	4	1,400
Kansas	11	5,900	..	....	7	1,460
Kentucky	10	4,175	4	3,850	36	8,635
Maryland	1	200	..	....	3	525
Michigan	7	3,250	..	....	1	1,100
Missouri	2	450	..	....	5	5,650
Ohio	6	10,100	6	8,050	10	4,150
Oklahoma	10	1,830	5	2,300	2	150
Pennsylvania	82	36,940	12	6,150	32	15,880
Tennessee	2	1,050	..	....	5	2,600
Texas	..	....	1	300	..	....
Virginia	13	11,520	..	....	4	1,125
West Virginia	61	46,455	16	10,695	65	19,890
Wyoming	1	50	..	....	3	600

Table II—Changes in Bituminous Producing Capacity by States Since Jan. 1, 1933

(Includes only mines producing 50 tons or more per day)
(Mines reported as closed or abandoned are excluded from the table in cases where no confirmation could be obtained from an officer of the company. The number and aggregate daily capacity of these operations are shown by States in Table I)
Symbols used in the table are: (A), mine abandoned; (E), coal exhausted, (N), new mine; (R), reopened mine; (S), semi-permanent closing.

Company and Mine Address	Daily Capacity, Tons
Alabama	
New or Reopened:	
Alabama Fuel & Iron Co., Acmar No. 6	(R)1,200
Closed or Abandoned:	
Alabama Fuel & Iron Co., Acmar No. 2	(E)800
Overton	(S)400
Black Diamond Coal Mining Co., Mossboro	(A)400
Davis Creek Coal & Coke Co., Rock Castle	(S)500
Gulf States Steel Co., Altoona	(S)500
Sayre	(S)1,500
Bessemer	(S)750
Arkansas†	
New or Reopened:	
Arkansas Anthracite Coal Co., Clarksville	(R)300
Arkansas Excelsior Coal Co., Huntington	(N)250
Blue Star Coal Co., Alix	(N)80
Boyd Excelsior Coal Co	(N)200
Diamond Anthracite Coal Co., Clarksville	(R)300
Excelsior Thin Seam Coal Co., Hackett	200
Great Western Coal Co., Bonanza	(N)400*
Ideal Coal Co., Paris	(N)60
New Deal Coal Co., Prairie View	(R)75
Sun Coal Mining Co	(R)100
Watson Coal Co., No. 3, Paris	(N)200
*In development; potential daily capacity, 2,500 tons.	
Colorado†	
Opened or Reopened:	
Huerfano Trading Co	(R)350
Pluto Coal Mining Co., Superior	(R)125
Illinois	
New or Reopened:	
Buffalo Rock Coal Co., Ottawa	(N)300
Delta Coal Mining Co., Carrier Mills	(N)2,800
Forsyth Carterville Coal Co	(N)850
Gulf Fuel & Mining Co., Sparta	1,500
Midland Electric Coal Corporation, Farmington	(N)5,000
Pyramid Coal Corporation, Danville	(N)500
St. Louis Coal Co., Coulterville	(R)2,000
Seymour Coal Co., Herrin	(R)3,000
Southern Coal, Coke & Mining Co., Muren No. 6, Belleville	400
Spring Valley Coal Mining Co., Spring Valley	200
Stiers Bros. Construction Co., Moro	(N)300
Whippoorwill Coal Co., Cutler	600
Wilmington Coal Mining Corporation, Marseilles	1,000
Closed or Abandoned:	
Buffalo Rock Coal Co., Ottawa	(A)75
Cosgrove-Meehan Coal Corporation, Paulton	(S)2,500
Franklin Mining Co., Benton	1,700
Indiana	
New or Reopened:	
Bicknell Coal Co., Panhandle 2, Bicknell	(N)1,800
Binkley Mining Co., Bobolink	(N)2,500
No. 10, Clinton	(R)1,400
Standard No. 5, Linton	(R)1,000
Birch Creek Coal Co., Centerpoint	(N)400
Blackfoot Coal Co., Oakland City	(N)2,500
Black Hawk Coal Corporation, Black Hawk	(R)800
Bonnie Brook Mines, Inc., Clay City	(N)500
Bradway Coal Co., Brazil	(N)70
Canal Coal Corporation, Petersburg	(N)800
Crescent Coal Co., Evansville	(N)900
Dixon Block Coal Co., Clay City	(N)800
Domestic Coal Co., Bicknell	(N)150
Dugger Domestic Coal Co., No. 2, Dugger	(N)150
Durkin Coal Co., Brazil	(N)50
Edgewood Coal Co., Terre Haute	(N)300
Fougerousse Bros., Jasonville	(N)50
Fourth Vein Coal Corporation, Linton	(N)200
Hallett & Frump Coal Co., Jasonville	(N)50
Hay & Jones Coal Co., Boonville	(N)185
Hickory Grove Coal Mining Corporation, Midland	(N)1,225
Linton-Summit Coal Co., New Hope, Linton	(N)1,800
Maumee Collieries Co., Chieftain 20, Terre Haute	(N)3,500
Mid-Continent Mining Corporation, Midland	(N)250
Monarch Coal Co., Brazil	(N)500
Morgan Coal Co., 6th Vein, Linton	(N)350
Nattkemper-Connelly & Co., Brazil	(N)125
New Liberty Coal Co., Oakland City	(N)550
Possum Hollow Coal Co., Jasonville	550
Rio Coal Co., Terre Haute	(N)50
Seipman, H. A., Clipper Block, Coalmont	(N)600
White Edge, Coalmont	(N)450
Shadylane Coal Co., Seeleyville	(N)50
Snow Hill Coal Corporation, Talleydale	3,500
Sternberg Coal Co., Boonville	(N)500
Universal Coal Corporation, Universal	(R)2,000
Wills, Fred H., Carbon	(N)310
Winslow Coal Corporation, Petersburg	(N)500
Wulfman & Gooch, Winslow	(N)250
Closed or Abandoned:	
Archbold Coal Co., Newburgh	(S)400
Baker-Dora Coal Co	(A)500
Bicknell Coal Co., No. 5, Bicknell	(A)1,400
Big Spring Coal Co., Clinton	(E)500
Indiana—Continued	
Binkley Mining Co., Essanbee, Clinton	(E)2,300
Standard 4th Vein, Linton	(E)1,600
Carbon Stripping Co., Carbon	(A)350
Electric Shovel Coal Corporation, Clinton	(E)2,500
Fernleaf Coal Co., Dering 6, Clinton	(S)3,000
Haywood-Weatherwax Coal Co., Linton	200
Korff Coal Co., Boonville	(A)750
Liberty Coal Co., Jasonville	(S)100
Linton-Summit Coal Co., Templeton 1, Linton	(A)2,500
Mechanical Coal Co., Hymera, Ind	(E)2,250
Seipman, H. A., Oakleaf, Coalmont	(E)200
Templeton Coal Co., Glendora 26, Sullivan	(A)1,600
Vermillion Coal Co., Clinton	(S)2,000
Iowa	
New or Reopened:	
Rutherford Coal Co., Beacon	(N)300
Closed or Abandoned:	
Penn Coal Co., Rector	(S)300
Kansas†	
New or Reopened:	
Alston Coal Co., Pittsburg	(N)1,000
Baird & Palmer, Mulberry	(N)50
DeGasperi Coal Co., Pittsburg	(N)200
Diamond Coal Co., Arcadia	(N)500
Kansas Fuel Corporation	(N)600
Kruger Coal Co., Cherokee	(N)200
Mayer No. 7, Cherokee, Kan	(R)300
Picton Coal Co., Arma	(N)200
Pittsburg & Midway Coal Mining Co., No. 17, Chicopee	(N)2,700
Straight Shot Coal Co., Pittsburg	(N)50
Sunflower Coal Co., Mulberry	(N)100
Kentucky	
New or Reopened:	
Cameo Elkhorn Coal Corporation, Big Shoals	(R)600
Goose Creek Mining Co., Hueysville	(N)50*
Greenough Coal Co., Hellier	(R)450
New Alma Coal Co., McCarr	(R)1,325
Sandy Valley Coal Co., Prestonsburg	(R)350
Shelby Steam Coal Co., Shelby	(R)50
Superior Mining Co., Bevinsville	(R)275
Tip Top Coal Co., Tip Top	(R)325
Twin Seam Elkhorn Mining Co., Drift	(N)250
Utilities Elkhorn Coal Co., No. 8, Pikeville	(R)600
*In development.	
Closed or Abandoned:	
Blue Diamond Coal Co., No. 3, Bonnyman	(E)750*
Cameo Elkhorn Coal Corporation, Mayking	300
Green River Mine, Mogg	(S)2,500
Melva Coal Co., Drift	300‡
*Additional facilities installed at No. 1 to take care of tonnage. ‡To be reopened.	
Maryland†	
New or Reopened:	
Potomac Big Vein Georges Creek Coal Co., Union No. 2, Zihlman	(R)200
Michigan†	
New or Reopened:	
Aurora Coal Co., St. Charles	(N)250
Chippewa Coal Co., Chippewa	(N)200
Consolidated Coal Co., Crapo, New Lothrop	(N)1,000
Monitor Coal Co., Bay City	(N)250
Owosso River Valley Coal Co., Owosso	(N)50
Robert Gage Coal Co., Unionville	(N)1,100
St. Charles Garfield Coal Co., St. Charles	(N)400
Missouri†	
New or Reopened:	
Cornell Coal Co., Bronaugh	(N)150
Tower Coal Co., Ardath	(R)300
Ohio	
New or Reopened:	
Barnes Coal & Mining Co., No. 7, Coshocton	(N)600
Fay Collieries Co., East Cadiz	(N)500
Hanna Coal Co., Dun Glen No. 11, Dun Glen	(R)3,000*
Willow Grove No. 10, Neffs	(R)4,000
Jefferson Co., Smithfield	(N)1,000
Starr-Jackson Mining Co., New Plymouth	(R)1,000
*Not operating at present.	
Closed or Abandoned:	
Akron Coal Co., Murray Hill No. 2, Cambridge	(A)1,000
Hanna Coal Co., Dillonvale No. 1, Dillonvale	(E)2,100
Piney Fork No. 2, Piney Fork	(E)2,000
Fairpoint No. 9, Fairpoint	(E)2,300*
Packard Coal Mining Co., Mine 68, Nelsonville	(A)350
Taber Coal Co., Cadiz	(A)300
*About April 1, 1936.	
Oklahoma	
New or Reopened:	
Blanco Coal Co., Blanco	150
C. B. H. Coal Co., Bokoske	75
Covington Coal Products Co., Tahona	310
Dane Coal Co., Poteau	65
Gillie Coal Co., Bokoske	200
King Poteau Coal Co., Poteau	(R)200

†For closed or abandoned mines in this State see Table I.

Company and Mine Address	Daily Capacity, Tons
Oklahoma—Continued	
Pocahontas Producer Coal Co., Haileyville	(N)600
Poteau Fuel Co., Poteau	(N)60
Turnipseed Coal Co., No. 1, Poteau	(N)60
No. 2, Poteau	(N)60
Wilburton Coal Co., Wilburton	100
Closed or Abandoned:	
Craig Valley Coal Co., McAlester	(A)300
Globe Coal Co., No. 1, Schulter	(A)100
Leavell Coal Co., Tulsa	(A)1,000
Superior Smokeless Coal & Mining Co., Tahona	(S)500
Tulsa County Coal Co., Tulsa	500
Pennsylvania	
New or Reopened:	
Alto Coal Co., Dean	(N)60*
Atlantic Mining Co., No. 2, Atlantic	(R)75*
Barnes Coal Co., Lancashire 15, Barnesboro	2,000
Baker Coal Co., No. 7, Uniontown	(N)50*
Beechwood Coal Co., Rockwood	(N)70*
Bethlehem Mines Corporation, Slick 3, Slickville	(R)360*
Bickerton, Mark C., Lock No. 3	(N)65*
Bowersox Coal Co., Cadogan 1, Cadogan	(R)85*
Brown Bros., Elizabeth	(R)50*
Byrne Gas Coal Co., Eddie 5, New Geneva	(N)90*
Central Moshannon Coal Co., No. 2, Houtzdale	(N)200
Charleroi Gas Coal Co., Van Voorhis	(R)200
Charmon Coal Co., Pricedale	(R)160*
Claene Coal Mining Co., No. 1, Ramey	(N)600
Clearfield Bituminous Coal Corporation, Moravian, Grassflat	(N)860*
Conemaugh Coal Co., Saltsburg	(N)500
Coyer, Robert, Grove City	(R)50*
Deringer Fuel Co., Woodland 2, Spangler	(R)350
East Windber Coal Co., Windber	(N)400
Fireside Fuel Co., Elizabeth	(N)180*
Fredericktown Coal & Coke Co., Greensboro	(R)1,500
Freeport Coal Co., Chicora	(N)800
Frick Coke Co., H. C., Kyle, Fairchance	(R)800*
Trotter, Connellsville	(R)1,300*
Goshen Coal Co., No. 6, Surveyor	(R)360
Gulbranson, W. O., Imperial 3, Houtzdale	(R)300
Heller Coal Co., Olive 2, Coleman	(R)50
Hillman Coal & Coke Co., Naomi, Fairhope	(R)1,350
Pike, Brownsville	(R)1,300
Indiana Smokeless Coal Co., Virginian 15, Armagh	(N)250
Inland Collieries Co., Indianola	(R)1,800*
Iseman, A. L., Freeport	(R)85
Kay Coal Mining Co., Tussey 2 and 3, Riddlesburg	(R)70*
Kiernan-Courtney Coal Co., Shippenport	(R)100*
King Coal Co., Chambers	(R)60*
Laurel Coal Co., Coaldale	(N)70*
Lehigh Valley Coal Co., No. 28 Slope, Snow Shoe	(N)700
Lemont 2, Lemont Furnace	(R)850
Lindsey Coal Mining Co., No. 8, Punxsutawney	(R)1,000
Lorraine Coal Co., Alsace 12, Sligo	(R)65*
Lowber Gas Coal Co., Fayette City	(R)3,500
M. & N. Coal Co., Mahaffey	(R)300
Markton Coal Co., Markton	(N)75*
McBride Coal Co., Willock	(R)50*
McCombie Coal Co., Millers Run 3, Elmora	(R)80*
Merrill Sons Co., W. A., Ponfeigh 8, Meyersdale	(R)160*
Mottern, E. D., Falls Creek	(N)75*
Mountain Top Coal Co., No. 1	(N)90*
New Alexandria Coal & Coke Co., New Alexandria	(R)300
Oneida Fuel Co., Butler	(R)200
Penker Coal Mining Co., No. 2, Portage	(N)200
Pfile Coal Co., Charleroi	(N)55*
Pittsburgh Coal Co., Mongah, Monongahela City	(R)1,500
Poland Coal Co., No. 3, Greensboro	(R)500
Powell Coal Co., Masontown	(R)1,000
Priscilla Coal Co., No. 2, South Fork	(N)60*
Purity-Connellsville Coal Co., Connellsville	(R)1,150*
Reid Coal Co., Timblin	(R)340
Republic Steel Corporation, Martin	(R)625*
Riverside Fuel Corporation, No. 2 South Fork	(R)140*
Royal Quemahoning Coal Co., Royal 1, Stoyestown	(R)300
Royal 2, Stoyestown	(R)300
Sandy Hollow Coal Co., Brookville	(R)485
No. 1, Oakland Junction	(R)500*
Seger Bros. Coal Co., Inc., Vogal 4, Wilpen	(N)265*
Shane Bros. Coal Co., Shippingport	(R)50*
Shawmut Mining Co., Brandy Camp	(N)350
Snyder Coal Co., No. 4, New Texas	(N)90*
No. 5, Renton	(R)90*
Sonman Run Coal Co., No. 1, Sonman	(R)115*
Standard Moshannon Coal Co., No. 4, Janesville	(R)120
Swanks Sons, Inc., Hiram, Johnstown	(N)80*
Thomas, A. P., Cogan Station	(N)50*
Union Collieries Co., Renton 8, Russelton	(R)2,500
Victoria Coal Co., Monessen	(R)150
Westmoreland Mining Co., Watson 1 and 2, Mooween	(N)1,000
West Penn By-Product Coal Co., Mt. Pleasant	(R)50*
Wilbur Coal Mining Co., Knickerbocker 2, Hooversville	(R)200
Windber Knob Coal Co., Krayn	(N)55*
Windber Hi-Grade Coal Co., Windber	(N)75*
Yough Connellsville Coal & Coke Co., Lemont 1, Lemont Furnace	(R)500
*Average in 1934.	
Closed or Abandoned:	
Brothers Valley Coal Co., Pen-Mar 3, Macdonaldton	(E)750
Cosgrove-Meehan Coal Corporation, Thermal 14, Acosta	250
Lehigh Valley Coal Co., No. 22 Shaft, Snow Shoe	(A)1,000
Madeira-Hill Coal Mining Co., Spangler 4, Barnesboro	(A)800
Ocean Coal Co., No. 2, Herminie	700
Pennsylvania Coal & Coke Corporation, No. 30-31, Patton	(S)150
Quemahoning Coal Co., Ralphton 4, Ralphton	(E)200
Ralphton 10, Rockwood	(A)100
Ralphton 14, Boswell	(A)100
Shawmut Mining Co., No. 31, Byrnedale	(S)800
Stonycreek Smokeless Coal Co., Hawes No. 1, Holsopple	(A)800
Westmoreland-Connellsville Coal & Coke Co., Ligonier	500

Company and Mine Address	Daily Capacity, Tons
Tennessee†	
New or Reopened:	
Black Diamond Coal Mining Co., Clairfield	(N)1,000*
Roane Iron Co., Rockwood	(R)50
*Expected capacity, now in development.	
Virginia†	
New or Reopened:	
Buchanan County Coal Corporation, No. 1, Big Rock	(N)1,430
No. 2, Big Rock	(N)885
Buchanan Smokeless Coal Co., Big Rock	(N)300
Carter Coal Co., Seaboard, Richlands	(R)300
Conoway Coal Corporation, Big Rock	(N)230
Consumers Mining Co., Red Ash	390
H. E. Harman Coal Corporation, Harman	(N)3,365
Home Creek Smokeless Coal Co., Home Creek	(N)750
Lynn Camp Coal Co., Grundy	(N)1,000
Panther Coal Co., Roseann	(N)2,000
Standard Banner Coal Co., Trammel	(R)400
Virginia Lee Coal Corporation, Home Creek	(N)370
Virginia Red Ash Coal Co., Richlands	(N)100
West Virginia	
New or Reopened:	
Adrian Fuel Co., Adrian	(R)1,050
Armco Coal Mining Corporation, Marting	(R)600
Bertland Coal Co., Accoville	(R)600
Berry Fuel Co., Bingamon, Pine Bluff	(N)400
Blake Coal Co., Tunnelton	(R)100
Buffalo Winifrede Coal Co., Chattaroy	(R)385
Carbon Fuel Co., No. 11, Notomine	(R)500
Central Pocahontas Coal Co., No. 2, Anawalt	(R)900
Chilton Block Coal Co., Ethel	(R)375
C. L. S. Coal Corporation, Maidsville	(R)1,050
Cole Coal Co., Princewick	(R)50
Conway Firecreek Coal Co., Jonben	(N)100
Crystal Block Coal & Coke Co., Rawl	(R)485
Douglas Coal Co., Fireco	500
Elkhorn Piney Coal Mining Co., Powellton 3, Elkridge	(N)2,200
Stanaford 1, Stanaford	(R)1,000
Ferrell Coal Co., Big Creek	(R)225
Frances Coal Co., Kilarm	(R)1,800
Freeport Coal Co., Tunnelton	(R)280
George-Starford Coal Co., Brownton	(N)325
Graves Coal Co., Madison	(R)150
H. & G. Coal Co., Loubert 10, Centralia	(R)70
Houck-Reidler Bros. Coal Mining Co., Louis, Tunnelton	(N)450
Houston Collieries Co., Maitland	(R)1,000
Imperial Colliery Co., Imperial 5, Burnwell	(R)500
Imperial New River Coal Co., Nuttallburg	(R)500
Jacobs Fork Pocahontas Coal Co., Squire	(R)175
Jamison Coal & Coke Co., Farmington 9, Farmington	(R)2,500
Jenkins Smokeless Coal Co., Wright 2, McCreery	(R)50
Kanawha & Columbus Coal Co., Gilmer	(R)280
Kingston-Pocahontas Coal Co., Orkney, Hemphill	(R)1,335
Lake Superior Coal Co., No. 2, Superior	(R)885
Legato-Trent Coal Co., Davey	(R)50
Lillybrook Coal Co., No. 6, Lillybrook	(R)150*
Long Fuel Co., Mt. Clare	(R)700
Low Volatile Coal Co., Concho	(N)800
Marra Coal Co., Berryburg 1, Berryburg	(R)420
McDermott, B. J., Miller 3, Kingwood	(R)325
Meadows Coal Co., E. W., Sullivan	(N)60
Miller-Todd Coal Co., Adrian	(R)875
Minds Coal Mining Corporation, Golden Ridge 6, Bergoo	(N)2,500
Minear Coal Mining Co., Adrian	500
Monongahela Rail & River Coal Corporation, Maidsville	(N)1,750
Mountain Fuel Co., Brownton	(R)1,050
Paulcille Mine, Centralia	(N)200*
Phil Williams Coal Co., Mabie	(N)200
Premium Smokeless Colliery Co., Caperton	(R)50
Raine Coal & Lumber Co., Duo	(N)350
Red Jacket, Jr., Coal Co., Wyoming	(N)2,100
Ridgeview Coal Co., Nellis	(R)475
Rock Lick Smokeless Coal Co., No. 2, Rock Lick	(R)900
Sked Coal Co., Harper	(R)100
South Pittsburgh Coal Co., Hildebrand	(R)2,000
Standard Coal Co., Two Lick	(R)1,000
Superior Sewell Coal Co., Inc., Mill Creek	(N)150
Tressler Coal Mining Co., Brownton	(R)700
United States Coal & Coke Co., No. 2, Gary	(R)2,665
No. 4, Gary	(R)2,100
No. 5, Gary	(R)870
No. 6, Gary	(R)3,195
Winisle Coal Co., Logan	(R)300
*In development.	
Closed or Abandoned:	
Berry Fuel Co., Brown No. 1, Oak Point	250
Davis Coal & Coke Co., Dartmoor 4, Dartmoor	(S)500
Elkhorn Piney Coal Mining Co., Midvale 1, Gamoca	(A)250
Elm Valley Coal Co., Elm Grove	(A)500
Fordson Coal Co., Twin Branch	(S)1,250
Greenbrier Coal & Coke Co., McDowell	(E)900
Houck-Reidler Bros. Coal Mining Co., Gorman 2, Tunnelton	250
Koppers Coal & Transportation Co., Princewick	(E)500
McDowell Coal & Coke Co., McDowell	(E)610
Meadow Fork Fuel Co., Mt. Hope	50
New River & Pocahontas Consolidated Coal & Coke Co., Berwind 6, Newhall	(S)2,000
Berwind 7, Newhall	(E)485
Panther Coal Co., Inc., Panther	(E)500
Rachel Gas Coal Co., Thermal 40, Rachel	1,800
Red Jacket Consolidated Coal & Coke Co., No. 8, Thacker	(E)600
J. A. Wood Coal Co., Jawood, Amigo	(E)250
Wyoming†	
New or Reopened:	
Nugget Coal Co., Hanna	50

†For closed or abandoned mines in this State see Table I.

NOTES
From Across the Sea

USE of rock dust in place of sand has been advocated for the fighting of mine fires, but I. C. F. Statham, of the University of Sheffield, indicates in *Colliery Engineering* that, despite its greater fineness and lesser porosity, rock dust is not without its compensating disadvantages, for it is readily carried along by the air current and therefore is more difficult to restrict to the region desired. The atmosphere becomes, moreover, so laden with dust that the progress of the fire cannot be discerned from a distance.

However, he concludes, in the absence of sand, it is a useful alternative, and a blanket of inert dust 2 or 3 in. thick will usually suffice to extinguish a fierce fire. Limestone dust also is particularly suitable for ordinary rock-dusting, so that the dual purposes of rock-dusting and making provision for fire fighting are served by storing of adequate quantities of such dust at convenient strategic points throughout the mine.

In his remarks Professor Statham fails to say that the rock dust falls not only on the burning coals on the mine floor but also on the unfallen material and so helps to extinguish it when burning. It also prevents the fire from attacking unbroken and unburning coal pillars. On the other hand, sand cannot attach itself to coal ribs and rarely can be placed so that it will fill up their crevices. Moreover, a cloud of inert dust should make the gas from the fire less explosive and bring rock-dusting conditions to such perfection that a gas explosion, if it occurred, would not cause a coal-dust explosion. Dust could be spread by mechanical equipment from a distance, whereas sand might have to be delivered by a shovel.

CHEMICAL cooling agents often have been proposed, and in some mines have been used, to lower the temperature generated by a blast, so that, even if a shot or shots should blow out, no flame would pass into the circumambient atmosphere. Notes on sheathings for explosives, having this in mind and as proposed and in part used in foreign countries, were published in *Coal Age*, July, 1934, pp. 282 and 283. However, much of the effectiveness of an explosive lies in the high temperature it generates, and a shot can be too generously cooled. Another factor besides cooling that makes a shot safe is the formation of an inert gas which will prevent delayed combustion of the products of the explosion.

In Paris, De Wendel et Compagnie has devised a patented arrangement by which carbon dioxide in the form of snow is introduced in an uncovered state into a borehole in front of or behind a blasting cartridge. Should the shot blow out, the dioxide clears the hole and even the surrounding air from firedamp and replaces it with an inert gas, thus preventing an explosion. Cartridges containing water or water-saturated material may also be used. The carbon dioxide is stored and carried in receptacles having double walls with a vacuum between them and with an internal lining of felt.

A COAL that breaks into thin slabs along the bedding planes usually does so because the beds have thin layers of impurity that promote such cleavage.

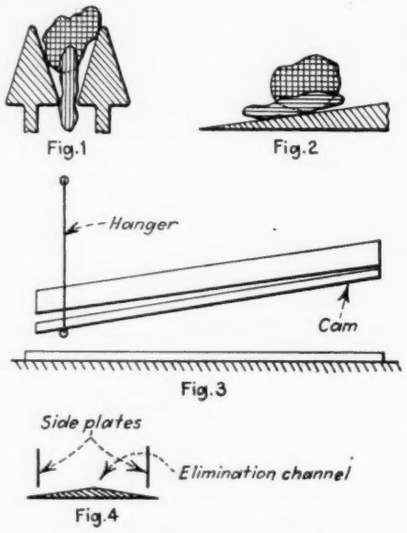

Fig. 1—Coal being turned by a lance for screening. Fig. 2—Coal slipping under a side plate. Fig. 3—Method of hanging screen. Fig. 4—Cross-section of screen showing how main plate slopes from center line to side plates.

Consequently flat coal, if not actually dirty, often has so much of that outward appearance as to be unacceptable to the consumer. For this reason at many mines every effort is made to eliminate these "flats."

Frequently, in Europe, the removal is effected on screens with bars of triangular or lance cross-section which cause the coal to tilt on their edges or points and drop between the bars if thin enough to do so, but the weight of the lump of coal, its irregularity, the motion of the table and the weight and wedging side pressures of other pieces of coal tend to force the lumps into spaces barely wide enough to receive them and tend to hold them in place when they have insinuated themselves into such spaces. All of which means a clogging of the screen.

This is sought to be avoided in equipment devised by the Campagnie Continentale de Criblage, Lavage, et Déschlammage des Charbons, of Charleroi, Belgium, described in *Colliery Engineering*. A sloping plate, serving as a shaking chute, is hung at one end by a vertical rod and at the other end is supported by a cam. It has, therefore, a swinging and bumping action, insuring constant vibration (see Fig. 3). The plate, or chute, slopes not only along its length but on either side of its longitudinal axis toward the side plates (see Fig. 4), but the latter are raised so that flat pieces of coal sliding away from the axis can slip under them. These are set at such a level above the chute of which they form a part that coal having one of its diameters less than a certain standard can pass under them. Thus the square and round coal continues down the chute and the flat coal drops to another reciprocating and bumping plate and the two travel their several ways. In practice three or more separate chutes with their side plates, forming "eliminator channels," are built into a unit and the coal escapes in the space between them, falling to the shaking chute below.

EUROPE seems to react more favorably than America to the booster fan, probably because conditions there make its frequent use almost obligatory. In Scotland, according to the district inspector's report for 1934, auxiliary fans totalling 5,600 hp. were in operation, the large number doubtless reflecting the thinness of the seams being worked.

At one mine, the Herbertshire Colliery, in Stirlingshire, as there was an excess of firedamp, Prof. A. M. Bryan, Royal Technical College, Glasgow, was called in to make an inspection and report. He concluded that the resistance of the air in passing down the shaft was so great and the leakages were so considerable that to erect a more powerful fan on the surface would not give a result commensurate with the operating cost involved, and recommended that a large fan be installed within the mine in one of the trunk returns, thus delaying for years the expense of sinking a new shaft. Speaking favorably of the services of the college in making this report, the inspector shows a disposition in favor of the use of booster fans underground, which is a practice somewhat in conflict with the ideas of our Bureau of Mines and State inspectors.

In view of the fact that leakage was one of the items influencing the decision, it seems that the recommendation might have been traversable, especially if the leakage should prove to be augmented later by the low pressure developed over a large area by the new fan. Justification for a booster fan does not lie in leaky stoppings. Furthermore,

the new fan might satisfactorily be placed outside the mine, where it would be more readily available for repair in case of an explosion and where an explosion would be less likely to cause injury to its parts. Warrant for a booster fan, if there be one, lies in high general air resistance or in the need to provide for the specific necessities of long splits.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Orders for all books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

Classification and Selection of Illinois Coals, by Gilbert H. Cady. Illinois State Geological Survey, Urbana, Ill. Bulletin 62; 354 pp., 6⅝x10 in.

Dedicated to the memory of S. W. Parr, whose contributions to the chemistry of coal were so many and valuable, this book records an immense number of analyses of face samples both proximate and ultimate.

Gypsum, says the author, is rarely found in fresh Illinois coal. The greater the quantity of total sulphur, the greater the relative quantity of pyritic as compared with organic sulphur. Illinois coals with less than 1.5 per cent sulphur contain pyritic and organic sulphur in about equal proportions, whereas in high-sulphur coals the pyritic sulphur commonly accounts for two-thirds of the sulphur present and organic sulphur rarely exceeds 2.5 per cent of the coal. The quantity of organic sulphur is much more constant than the quantity of total or pyritic sulphur. In general when the organic sulphur exceeds 2 per cent of the coal, the pyritic sulphur exceeds 3 per cent and may be much higher. In most Illinois beds more or less restricted areas are found in which the sulphur content does not exceed 2 per cent.

The author believes that low sulphur content reflects a relatively high percentage of preservation of the plant material. This is a new point of view. Others have said high pyritic sulphur content was due to the invasions of the sea and high organic sulphur to the presence of bodies capable of adsorbing or combining with the sulphur, or to the presence in the peat bog of alliaceous vegetation which concentrates sulphur by a biochemical process. The idea that the percentage of preservation of vegetal matter determines sulphur content is presented by the author without emphasis or further comment. However, perhaps it may be pardonable to point out that in the No. 6 coal the sulphur content runs from 0.5 in Franklin County to 5.7 per cent in Madison County—a ratio of 11.4 to 1. One can hardly believe that the reduction in the thickness of the coal is in any such proportion. It would be necessary to believe that the Franklin sector of the bog must have been amazingly thinner than the sector of the bog in Madison.

On the whole, it is true, the No. 6 coal in Franklin County is thicker than that of Madison County, but the differences are not of the order of 11 to 1; in fact, rather 1.4 to 1. The reviewer fears to hazard a reason why the Madison County coal is the thinner and the more sulphury, but the first condition may be due to marine erosion and the second condition may result from the entrance of the sea water into the bed, leaving its sulphates as sulphides to contaminate the coal.—R. DAWSON HALL.

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Fuel, Solid, Liquid and Gaseous, by J. S. S. Brame and J. G. King. Longmans, Green & Co., New York City. 422 pp., 5¾x9¼ in. Price, $8.50.

Because of the rapidity with which fuel technology advances, this new British book, which embodies the latest advances, will be welcomed by all those who have to deal with fuels, especially from the technical viewpoint. No space is given to steam boilers except to describe the various methods of spraying oil and pulverized coal for combustion purposes. Seven of the chapters relate to solid fuels, their character, composition, treatment and storage. Low-temperature carbonization also receives some restricted treatment. Gaseous fuels are treated in four chapters which describe their characteristics and methods of manufacture. The remainder of the book covers liquid fuels, fuel analysis and calorimetry.

"In general," declare the authors, "flame is inefficient for heating purposes where there is a great difference between its temperature and that of the surface being heated, as in a boiler. This is due to two causes: the checking of combustion by lowering of temperature and the formation of a thin layer of gas, which is a poor conductor of heat, along the surface of the plate. Much depends, however, on the luminosity of the flame. Because of the presence of highly heated particles of solid carbon, to which most of the luminosity of all ordinary flames is due, the radiant effect from such flames is fairly high, while with a non-luminous flame radiation is less." The authors in the last part of this quoted paragraph arrive at the intrinsic inefficiency of gas fuels—lack of radiance—which, however, can be in a degree corrected by providing bodies capable of radiation on which the flame may impinge.

Unfortunately, the book opens with a highly controversial statement: "With the exception of natural oils, the origin of which still remains uncertain, all forms of fuel may be regarded as derived primarily from cellulose, often associated with material of a gum or resin character." However, having thus broken bread with the cellulosists, the authors further in the book admit that "the present state of knowledge does not admit of a definite pronouncement in favor of either theory" and quote a number of authorities for and against the belief that cellulose is the basis of coal, of some types of coal or of some parts of the various seams.

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The Pneumonokonioses (Silicosis), Literature and Laws of 1934, by G. A. Davis, E. M. Salmonsen and J. L. Earlywine. Chicago Medical Press, Chicago. 498 pp., 6x9¼ in.; cloth. Price, $10.

Prepared mainly to inform the legal and medical professions, this valuable book gives a digest of articles on the subject termed by the authors "The Pneumonokonioses," covering silicosis, asbestosis, anthracosilicosis (or miners' asthma) and other imperfectly differentiated diseases. In the main it consists of digests arranged by authors where names are available, otherwise by subjects. An author index and a subject index are followed by a review of the legal decisions rendered during 1934 relative to pneumonoconiosis and other occupational diseases, which decisions cover in their broad scope osteomyelitis, tularemia, Rocky Mountain spotted fever, mitral stenosis, epilepsy and benzol poisoning, doubtless with the idea of showing the attitude of the courts of the several States toward diseases acquired in laboring occupations.

Few articles except those appearing originally in English are digested, but there is a useful list of other articles in English and foreign languages. Some of the articles digested are digests in themselves, but the publication of some of these is well justified, for the original papers and remarks have not been published elsewhere. Those desiring information on this subject will find in these indexes and digests data on all kinds of pneumonoconiosis and their avoidance.

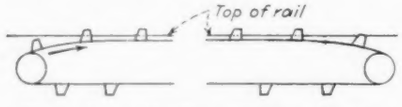
With this volume and with the U. S. Bureau of Mines Reports of Investigations Nos. 6835 and 6848 the public will be able to get in touch with all the latest developments of this wide-reaching subject, the importance of which will be minimized if the diseases are understood and appreciated before they become prevalent.

OPERATING IDEAS

From Production, Electrical and Mechanical Men

Gradual Rise of Feeder Dogs Easier on Cars

Installation of the sprockets of chain-type car feeders too high is a common mistake, according to A. R. Long, superintendent of the Summerlee mine of the New River Co., Fayette County, West Virginia. As a result, the dogs come up too rapidly and therefore tend to punch holes in the bottom of that type of car built with a low flat bottom to carry a heavy load.



Dogs rise gradually to contact the car

The accompanying drawing indicates schematically the arrangement of the loaded-car chain feeder installed in Summerlee mine early in 1935 along with 500 new mine cars. The sprockets are set so low that after a dog comes up around the sprocket it is not high enough to touch the car bottom. It is raised to engaging position by travel of the chain up a gradually inclined guide channel. The same principle is followed at the other end and, according to Mr. Long, the gradual disengaging reduces the chance of the dogs not freeing properly.

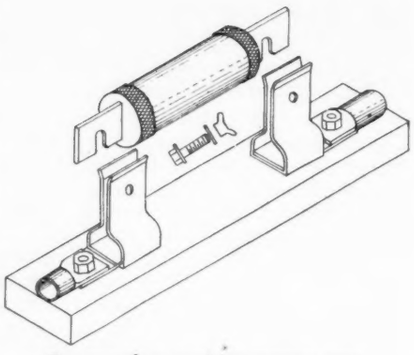
Bolted Fuse Clamps Improve Protective Service

Adding bolts to fuse terminals instead of depending entirely on the spring clamps for contact pressure has improved the performance of fuses on mine locomotives on which the bolts have been applied. Because heat from faulty contact is eliminated, the fuses do not blow except as a result of electrical overload and thus less supervision is required to prevent motormen bridging the fuses with copper wire or with additional links to increase capacity.

The accompanying drawing shows a method of bolting which has proved satisfactory. Slots in the fuse terminal reduce the time required to replace a fuse and also have the advantage that the wing nut needs to be loosened but slightly, thus reducing the chance of dropping or losing the nut, washers or bolt. Separate clamps for providing contact pressure, an alternative to the bolt method, have the disadvantage of being lost easily.

In fuse boxes where the bolts and wing nuts are used, a notice should be posted cautioning against touching the wing nuts while voltage is on the circuit. As an aid to proper maintenance the ampere rating of the fuse to be used in the box should be stamped on the clamps, base or box. Inspectors or foreman are thus afforded a convenient and accurate means of checking fuse capacity against the standard specified for the equipment.

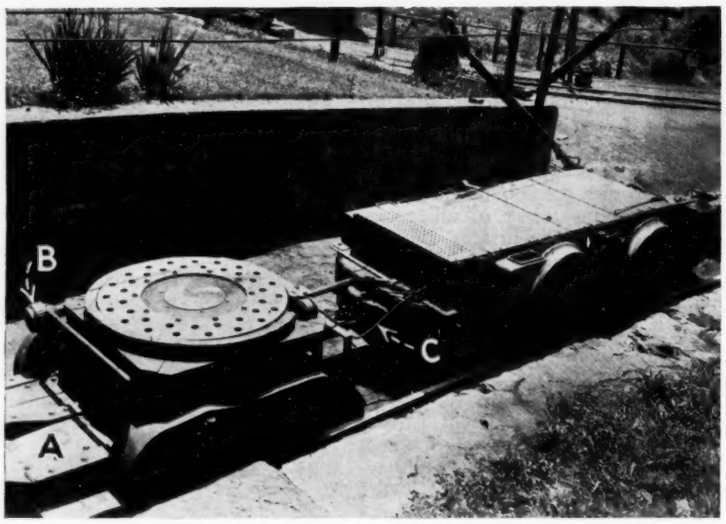
This practice of adding bolts to fuse terminals applies, of course, to other classes of mine equipment besides locomotives. It was mentioned briefly by B. F. Grimm, consulting electrical engineer, Koppers Coal & Transportation Co., in a paper "Transportation in Coal Mines," read at a meeting of the Pocahontas Mechanical and Electrical Institute, Bluefield, W. Va.



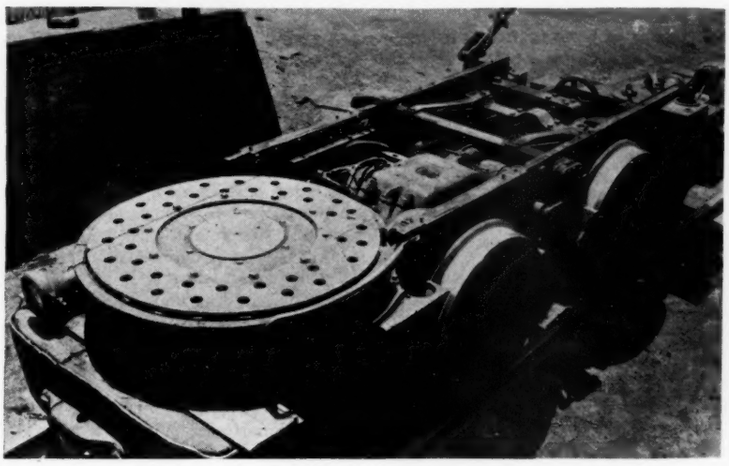
Converted to positive-contact type

Locomotive Height Cut by Removing Motor Or Adding Pony Truck for Reel

REMOVAL of one motor and addition of a pony truck to carry the cable reel are the two ways by which eight conductor-cable-reel gathering locomotives at the Stotesbury (W. Va.) mine of the Koppers Coal & Transportation Co. were changed to reduce the height from 39 in. to 32 in. Both methods are successful, but each has



"A" is the space on the trailer for the brakeman; "B," the trailer headlight; and "C," trailing cable which passes through locomotive under the cover



Covers removed to show arrangement after removal of one motor and rebuilding

advantages and disadvantages as compared to the other.

Originally the locomotives were equipped with two Type H.M.801 motors, tandem hung, and the cable reels were mounted above the tops of the side frames. Changes to the two locomotives first rebuilt consisted of taking out one motor, cutting the tops of the side frames away at the end opposite the cab, and mounting the cable reel in the space vacated by the one motor. This lowers the reel so that its top is level with the top of the frame.

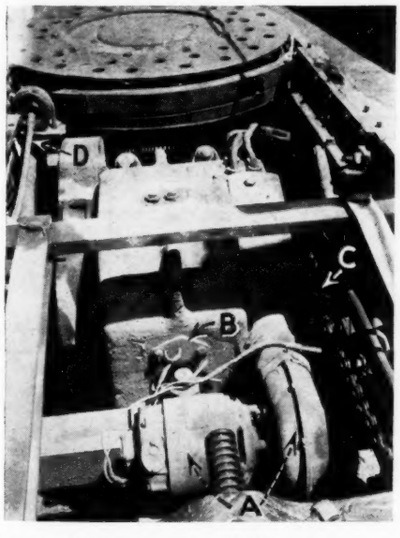
The remaining motor drives the axle adjacent to the reel, and this motor was turned so that it is now between the axles. Traction with both trucks was secured by connecting the axles with a No. 472 roller propelling chain which is interchangeable with those of the shortwall machines used at the mine.

To enable the one remaining motor of the locomotive to do the work formerly done by two motors, it was equipped with a blower. Protection consisting of a thermostat in the field frame and a contactor operating in conjunction was also added to the equipment, and results were better than anticipated. A locomotive thus equipped finishes the shift with its motor cooler than those on locomotives having the original equipment.

The principal disadvantage of the locomotives thus rebuilt is that the space allowed for the brakeman to ride is not as large as desired. This limitation led to the second method, whereby the motor equipment of the locomotive was not disturbed but the reel was removed and mounted at a low elevation on a pony truck or trailer permanently connected to the locomotive. This trailer includes reel, bumpers and a large space for the brakeman to ride.

Six of the locomotives have been reduced to the lower dimension by this trailer method, and it is considered preferable because of the superior accommodation for the brakeman. Sixteen-inch mine-car wheels and axles equipped with Timken bearings were used in making the trailers, and to provide the necessary stability each trailer was loaded with iron weights to bring the total weight to 2,200 lb.

Greater power requirements and heavier duty on the equipment are disadvantages of the trailer-equipped locomotive, but it requires less clearance around turns than would the first type of changed locomotive if its frame and bumper were extended to provide an equally large space for the brakeman.



"A" is the blower unit added to cool the one motor; "B," the thermostat; "C," the chain connecting the axles; and "D," the trailing cable which works beneath the locomotive covers

No Status Quo

MAINTENANCE of the status quo, history teaches us, is a rarely attained objective. Affairs and men seldom, if ever, stand still on the slippery pinnacle of non-changing conditions. They either go forward or slide back. To help operating, electrical, mechanical and safety men keep their place in the forward-moving ranks, *Coal Age* collects and publishes each month the tried and proved aids to efficiency appearing in these pages. Our success, of course, is credited largely to the men at the mines, to whom this department always is open. If you have an idea which has helped you over a rough spot, send it in. Acceptable ideas will bring their authors $5 or more each from *Coal Age*.

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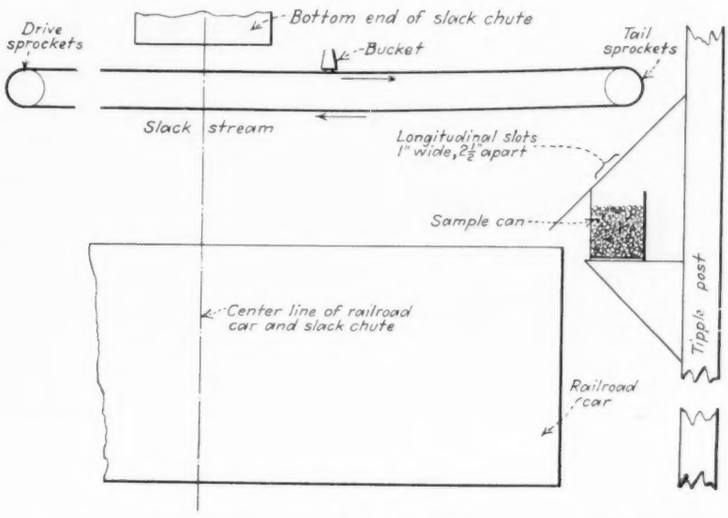
Single-Bucket Conveyor Gets Average Slack Sample

Sampling of slack at Kilpoca No. 3 mine, Killarney Smokeless Coal Co., Killarney, W. Va., is effected automatically by a bucket conveyor which moves through the stream of coal as it falls from the slack



Every 50 seconds deposits one-seventh of a slack-stream cross-section sample

chute into the railroad car. The double-strand chain conveyor operates in a horizontal plane and is unsupported between the drive and tail sprockets, which are mounted on the tipple framing at each side of the slack loading chute. Only one bucket is mounted on the chain and this is of special shape to insure accurate sampling.

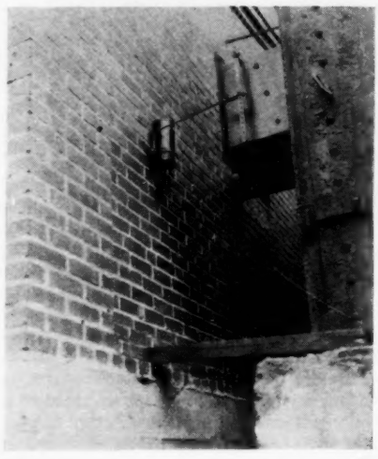
Referring to the drawing, the bucket sides are tapered so that the opening at the top is a slot 1 in. wide and 14 in. long. The object of this small opening at the top is to slow the filling of the bucket so it will contain coal from all parts of the stream. At the tail sprocket the bucket turns over and discharges its 7-lb. sample into a chute which leads back into the railroad car. Approximately one pound of the bucketful drops through short slots in the bottom of the chute and is deposited in a sample can.

Speed of the chain conveyor is adjusted so that the single bucket makes a complete revolution and collects a sample every 50 seconds. Approximately 60 lb. is the total weight of slack deposited in the sample can while one car is being loaded.

Performance of this automatic sampler has been checked by meticulous hand sampling, and the analyses of the final samples collected by the two methods have been found to be practically the same. The design of this sampler was not copied from an existing installation but instead was worked out at the mine by combining suggestions made by several of the officials.

Timing Relay Used in Alarm Added to Fan Control

Recently the Lehigh Navigation Coal Co. added air-gate switches and the necessary relays to its full-automatic and remote fan controls in order that, in addition to having a motor-failure alarm, an alarm would result from a broken belt, excessive belt slippage or any condition causing a failure of mine ventilation pressure. The alarms are given at the main colliery substation, where an attendant always is on duty. Selection of the proper relays for installation at the fan made it unnecessary to run additional control lines from the fan to the substation.



The air gate operates a control switch

The accompanying illustration, made at No. 3 fan, Nesquehoning, shows the air gate which was fastened over a hole cut in the fan housing and the air-gate switch fastened to the brick wall of the fan-motor room. The gate is a $\frac{5}{16}$-in. steel plate, $15\frac{3}{4}$x$20\frac{3}{4}$ in., hung on a hinge pin from which a lever and rod communicate the motion to the switch. The gate-box opening is covered with copper screen. When the fan is operating, air pressure holds the gate up in a position to seal the opening. When pressure fails, gravity swings the gate down to vertical. Normally the gate switch is open; when pressure fails it is closed.

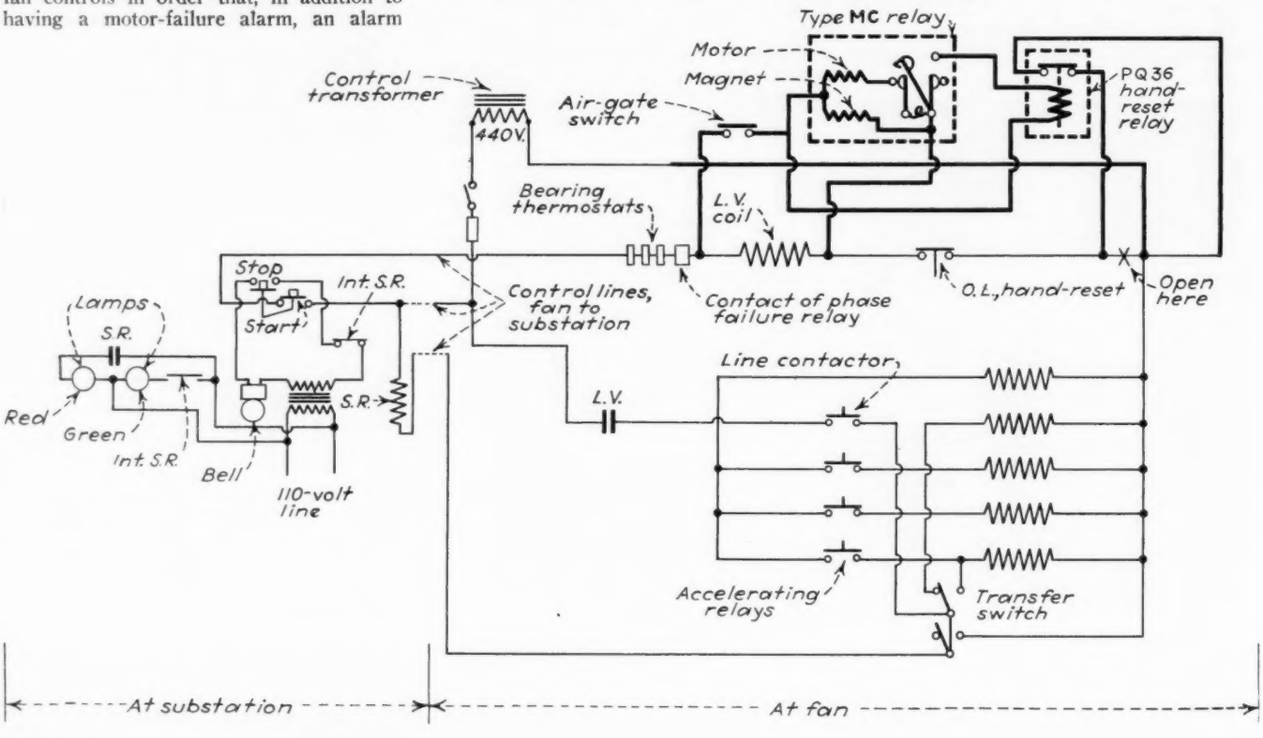
Heavy lines in the wiring diagram, which includes only control circuits, indicate the connections which were added to install the airgate switch and two relays. The type MC relay is a definite-time relay, and for the fan alarm duty it is set at between 30 seconds and one minute.

Upon closing of the air-gate switch due to ventilation pressure—positive or negative, depending on whether the fan is blowing or exhausting—timing of the MC relay begins. Its final operation opens the contacts of the PQ36 hand-reset relay, which in turn deenergizes the low-voltage contactor. That action deenergizes all contactors to shut down the fan. Opening of the SR relay turns off the red lamp which indicates normal operation, lights the green lamp and starts the bell.

When the start button is pushed for normal starting of the fan, the low-voltage coil becomes energized to close its contacts, which in turn energize the MC relay through the air-gate switch and the line contactor to start the motor. If the motor accelerates properly and therefore comes up to speed before the MC relay has had time to act, the air gate is pulled to operating position by the air pressure and the air-gate switch thus deenergizes the MC relay.

During the normal starting period the closing of the final contactor which short-circuits all rotor resistance also operates the transfer switch. One of the functions

Heavy lines indicate control circuits added when installing ventilation pressure alarm

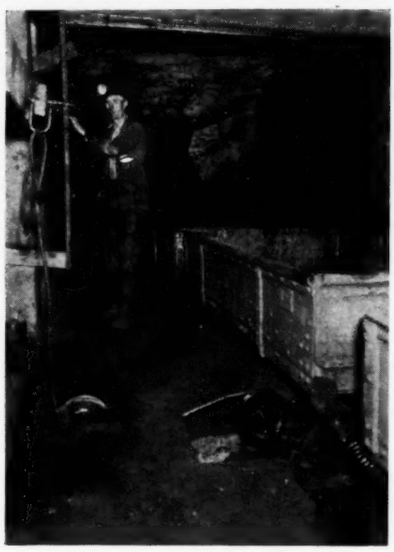


of this transfer switch is to close the SR contactor, thus lighting the red lamp and deenergizing the bell which has been ringing during acceleration.

Labor Saved and Bumps Eased By Dogs in Empty Hole

To localize the job of coupling cars in the empty hole and to reduce the distance of travel and consequently the speed of the cars in their movement from the kick-back to the point of assembly, a pair of manually operated spring-bumper dogs were installed recently in Summerlee mine of the New River Co., Fayette County, West Virginia. One man now does the work that formerly required two.

The accompanying illustration, looking toward the kick-back end of the empty hole, shows the dogs in the normally closed position, thereby holding the cars on the grade. After each car is coupled the lever is pulled down to open the dogs. After the trip has moved downgrade one car length



Couples a car and then pulls the lever to drop the trip one car length

the lever is released to stop the trip by catching the next car. The practice is varied, however, at the convenience of the operator. He may couple two or three cars and then drop the trip the corresponding number of car lengths.

The dogs contact bumping plates at the corners of the car body. The cars are new and the plates were built into them to work in conjunction with new caging equipment installed as a part of the new-car project. Before the dogs were installed those cars making up the forward section of a trip coasted several hundred feet and were subjected to severe impact. The coupler's job was "all along the line" and his chance of accident was greater than it is with the new arrangement.

A. R. Long, who is superintendent of the mine and conceived the idea of installing the dogs to stop the empty-hole abuse which had been going on in the mine for many years, is the inventor of a drop-axle design used on the 500 new cars, which were installed early in 1935.

Hard Surfacing Needed for Bits Reflects Grinding Methods

In response to questions as to the number of bits that can be tipped with a given quantity of hard-surfacing material, Walter Baum, master mechanic, Perry Coal Co., O'Fallon, Ill., author of the article on treating cutting machine bits which appeared in the October, 1935, issue of *Coal Age*, p. 411, offers a number of comments which are abstracted in succeeding paragraphs. Under the system used with the St. Ellen mine bits, 10 lb. of tungsten carbide is used in tipping 4,000 bits, against a figure of 8,000 claimed by some sponsors of hard-surfacing materials. Even though the St. Ellen figure is only half the other, it is considered satisfactory, says Mr. Baum.

Figs. 1 and 2, offered by Mr. Baum, show, respectively, a steady rest used in grinding after hard surfacing is applied and three types of bits. *A* in Fig. 2 is a bit as received from the manufacturer to which a hard-surfacing deposit ¾ in. long has been applied. The lines show the length of the grinds to give the proper clearance. *B* is a bit after reforging and water-quenching. Length of grind is reduced somewhat, but in both bits there is the possibility of leaving the back of the bit higher than the point. *C* is the bit developed by Mr. Baum, which, he states, is giving good results through elimination of the bad features of the other types. It will be noted that the angle has been changed. Just as much metal is removed in grinding as in the other two. *D* is a view of Bit *C* at the time of the last grind.

The rest used in grinding (Fig. 1) is made with an adjustable holder to facilitate keeping the rest the proper distance away from the wheel. Reference lines 1 to 5, inclusive, show the positions to which the rest should be moved to get the full use of the face of the wheel and eliminate wheel dressing. When a number of bits are ground in one position of the rest, the wheel develops a deep groove. Providing two notches in the rest makes it unnecessary to move it so often. Movements of the rest, when necessary, should be just enough to set the notches over ½ in. from the groove.

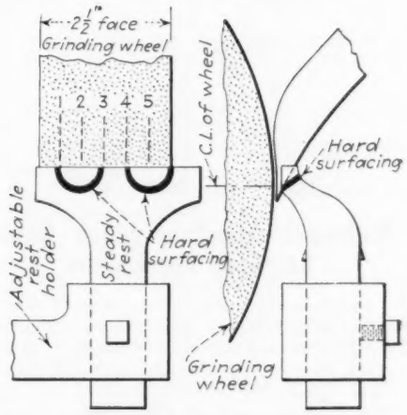
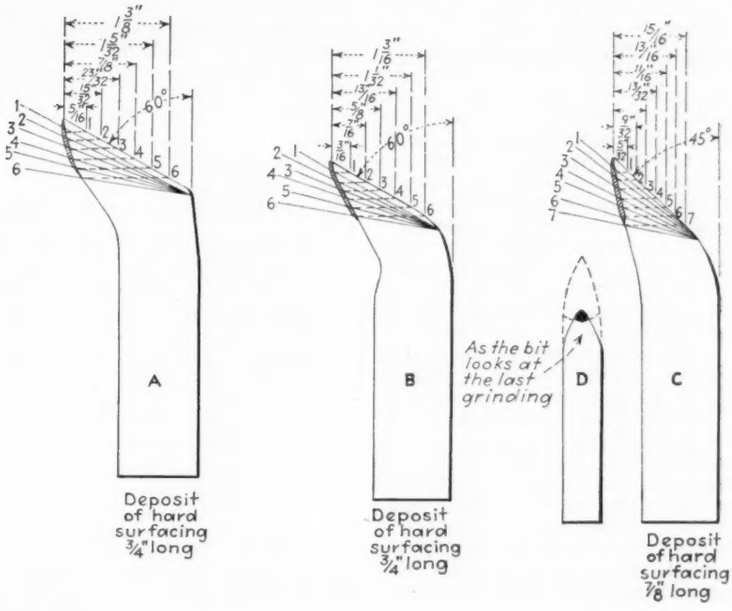


Fig. 1—Details of rest used in grinding hard-surfaced machine bits

The bottoms of the notches are lined with a deposit of hard-surfacing material. Otherwise, hard-surfaced bits will cut into the rest and make it impossible to impart the rocking motion necessary to give the back of the bit clearance. Contrary to the opinion held in some quarters, Mr. Baum declares, bits held against the wheel in this manner will not bind if the holder and rest are made strong enough and the distance between the wheel and rest is maintained.

Fig. 2—Three types of cutting-machine bits, showing lengths of grinds for the different stages of wear indicated by the broken lines



WORD FROM THE FIELD

Railroads Ask Emergency Rates Be Made Permanent

Indefinite extension of the present emergency surcharges on interstate shipments of bituminous coal and coke is asked in a petition filed by the railroads with the Interstate Commerce Commission on Jan. 24. The carriers seek to have these charges made a part of their regular rate schedule, declaring that the increases in the various class and commodity rates will show a yield of $100,000,000 additional revenue during the year ending April 18 next. They report having received $65,000,000 additional revenue between April 18, 1935, when the surcharges became effective, and Dec. 1. The surcharges allowed, which were published to expire on June 30 next, are as follows: 3c. per ton on rates from 15 to 75c.; 5c. on rates from 76c. to $1; 10c. on rates from $1.01 to $1.50, and 15c. on rates from $1.51 up (*Coal Age*, May, 1935, p. 223).

Immediate cancellation of the surcharge on lake cargo coal was asked in a petition to the commission filed during the preceding week by the Coal Control Association of Western Pennsylvania. This action is asked with a view to promoting the movement of lake coal prior to June 30. Similar action was taken by the Property Owners' Committee, representing coal producers in the Southern fields; Ohio operators and the Maher Coal Bureau, representing Lake Superior coal dock companies. All of these petitions assert that the lake market will be demoralized during the early season unless the surcharge is eliminated before lake shipping opens.

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Research Tests Show Progress

Progress in tests on "The Relation of the Size of Bituminous Coals to Their Performance on Small Underfeed Stokers" and on "Clinker Formation in Small Underfeed Stokers" is shown in bulletins issued Jan. 24 by Bituminous Coal Research, Inc. The studies are under way at the laboratory of the corporation at Battelle Memorial Institute, Columbus, Ohio.

For most advantageous use on small underfeed stokers of screw-feed type, the top size of coal need be no more than 1-in., and possibly not larger than ¾-in., according to Technical Report No. 1, Part 1. Charts, photographs and tables show the relation of the size of coal put into the hopper to that delivered to the stoker retort to be burned. The report also shows the segregation of sizes that occurs in the hopper and in the retort as related to the original size of the coal, and the effect of oil treatment of coal on the crushing and segregation. Coals from four important producing districts were used in the tests, which are under the supervision of Ralph A. Sherman and E. R. Kaiser. Burning tests to determine the relation of size to performance for a number of representative coals also are under way.

The use of addition agents to promote clinkering of refractory ashes is discussed in Information Bulletin No. 1, covering a study undertaken as a result of an inquiry about how to dispose of ashes of high fusion temperature under stoker firing during mild weather in autumn or spring. Although the investigation has not been carried to a conclusion, the tests made with a number of addition agents have yielded results of such interest that it was deemed advisable to distribute the information thus far obtained in the form of a preliminary report. Copies of the report and bulletin may be obtained, at 25c. and 10c. each, respectively, from Bituminous Coal Research, Inc., 803 Southern Building, Washington, D. C.

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Coal Committee to Meet

Committee D-5, on coal and coke, of the American Society for Testing Materials, among others, will meet at the Hotel William Penn, Pittsburgh, Pa., during A.S.T.M. committee week, March 2-6. Including main committees and sub-groups, nearly one hundred meetings will be held, and there will be a review of research programs, existing standard specifications and tests, and consideration will be given to new specifications now under development.

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AVERT BRITISH COAL STRIKE

THE impending nation-wide coal strike in Great Britain was averted on Jan. 24 when the Mine Workers' Federation agreed to accept a revised wage increase offered by the colliery owners. The increase amounts to a shilling a day, a matter of three pence threatening for a time to precipitate a strike. Yorkshire mine owners had previously offered only nine pence a day increase, but when they agreed to raise it to a shilling, the miners' delegates decided against a strike by a vote of 360,000 to 112,000. The strike menace hung over the industry for six weeks.

A.I.M.E. Coal Division Plans Broad Technical Program

Mechanical mining and cleaning and research will hold a large share of attention of the Coal Division at the 145th meeting of the A.I.M.E., to be held Feb. 17-21 at the Engineering Societies Building, New York City. Besides the election of officers, including a new chairman to succeed John T. Ryan, vice-president, Mine Safety Appliances Co., the program will include the following papers:

"Effect of Volume vs. Weight on the Grindability of Coal," C. G. Black, preparation department, Pittsburgh Coal Co.

"Further Investigation of a Method for Estimating the Grindability of Coal," H. F. Yancey and M. R. Greer, U. S. Bureau of Mines, with discussion by G. B. Gould, president, Fuel Engineering Co. of New York; E. G. Bailey, vice-president, Babcock & Wilcox Co.; A. C. Fieldner, U. S. Bureau of Mines; and J. B. Morrow, preparation manager, Pittsburgh Coal Co.

"Statistical Analysis of the Progress in Mechanical Cleaning of Bituminous Coal From 1927 to 1934," Leo N. Plein, U. S. Bureau of Mines, with discussion by H. E. Nold, professor of engineering, Ohio State University; J. B. Morrow; Byron M. Bird, chief concentration engineer, Battelle Memorial Institute; H. F. Hebley, Allen & Garcia Co., and R. Dawson Hall, engineering editor, *Coal Age*.

Report of committee on bituminous research planning, Edward Steidle, dean, school of mineral industries, Pennsylvania State College, chairman; discussion by C. M. Smith, department of mining and metallurgical engineering, University of Illinois; A. W. Gauger, director, mineral industries research, Pennsylvania State College; E. G. Bailey; J. B. Morrow; L. E. Young, vice-president, Pittsburgh Coal Co.; H. E. Nold; Clyde E. Williams, director, Battelle Memorial Institute, and H. N. Eavenson, Eavenson & Alford.

"Concentration of the Banded Ingredients of Illinois Coals by Screen Sizing and Washing," Louis C. McCabe, Illinois Geological Survey; discussion by H. F. Hebley; G. R. Delamater, W. S. Tyler Co.; Byron M. Bird; John Griffen, Koppers-Rheolaveur Co.; D. R. Mitchell, department of mining engineering, University of Illinois, and J. B. Morrow.

"Application of Mechanical Methods to the Mining and Cleaning of Pittsburgh No. 8 Coal," John H. Richards, chief mining engineer, Hanna Coal Co.

"Fusain Content of Coal Dust From an Illinois Dedusting Plant," Gilbert Theissen, Illinois Geological Survey; discussion by A. W. Gauger; F. A. Jor-

dan; O. O. Malleis, manager, inspection division, Appalachian Coals, Inc.; Paul Weir, vice-president, Bell & Zoller Coal & Mining Co.; H. J. Rose, Mellon Institute of Industrial Research; Frank H. Reed, Illinois Geological Survey; Gilbert H. Cady, Illinois Geological Survey; A. C. Fieldner and J. B. Morrow.

"Importance of Pulp Density, Particle Size and Feed Regulation in Flotation of Coal," John T. Crawford; discussion by H. F. Yancey, D. R. Mitchell, Byron M. Bird and J. B. Morrow.

"Use of Reflected Light in Photographing Interiors of Shafts and Slopes," W. W. Fleming, U. S. Geological Survey; discussion by W. C. Mendenhall, director, U. S. Geological Survey; J. J. Rutledge, chief mining engineer, Maryland Bureau of Mines; H. I. Smith, U. S. Geological Survey, and George H. Ashley, State Geologist of Pennsylvania.

"Prospecting for Anthracite by the Earth Resistivity Method," Maurice Ewing, Lehigh University; J. W. Peoples, Wesleyan University; A. P. Crary and J. A. Peoples, Jr.; discussion by Sherwin F. Kelly; George H. Ashley; R. H. Knapp, assistant engineer, Philadelphia & Reading Coal & Iron Co.; A. R. Matthews; W. L. Cumings, Bethlehem Steel Co., and H. J. Rose.

"The Need for Coal Research," H. H. Lowry, director, coal research laboratory, Carnegie Institute of Technology; discussion by J. H. Tobey, manager, engineering department, Appalachian Coals, Inc.; A. R. Powell, research division, Koppers Construction Co.; Clyde E. Williams, O. O. Malleis, E. G. Bailey, J. B. Morrow, A. C. Fieldner and H. J. Rose.

"Bituminous Coal for Higher Temperatures in Open-Hearth Operation," Theodore Nagel, vice-president, Carburetted Gas, Inc.; discussion by Ralph H. Sweetser; Henry Kreisinger, Combustion Engineering Corporation; Herman Van Fleet, and H. H. Lowry, director, coal research laboratory, Carnegie Institute of Technology.

A.M.C. Elects Officers

All officers of the American Mining Congress were reelected at the annual meeting, held Jan. 14 and 15 at the Waldorf-Astoria Hotel, New York City. These are as follows: President, Howard I. Young, president, American Zinc, Lead & Smelting Co.; vice-presidents, D. D. Moffat, vice-president, Utah Copper Co.; J. B. Putnam, Pickands, Mather Co., and D. A. Callahan, president, Callahan Zinc-Lead Co.; secretary emeritus, J. F. Callbreath; secretary, J. D. Conover. James D. Francis, president, Island Creek Coal Co., succeeds Paul Weir, vice-president, Bell & Zoller Coal & Mining Co., as director. Other directors chosen are Mr. Callahan; Mr. Moffat; Mr. Putnam; Clinton H. Crane, president, St. Joseph Lead Co., and W. J. Jenkins, president, Consolidated Coal Co. of St. Louis. Aside from the election, only routine business was transacted, including adoption of resolutions, committee reports and reports on activities in Congress by Secretary Conover and Treasurer Daveler.

Guffey Act to Reach Supreme Court March 11; Classification and Pricing Under Way

WASHINGTON, D. C., Jan. 27.—Although the National Bituminous Coal Commission continues to go about the work of putting the machinery of the Bituminous Coal Conservation Act of 1935 in working order, the attention of proponents and opponents of the act is being directed with increasing interest toward March 11, when the Supreme Court of the United States will hear arguments on its constitutionality. The commission issued on Jan. 2 General Order No. 12, and Special Orders Nos. 12-a and 13-a.

General Order No. 12 required all district boards to classify coals and adopt standards of coal classification, methods of applying such standards, and rules of procedure for making classifications on or before Jan. 14; provided for review by the commission of standards, methods and rules, and set Jan. 16 as the date for a hearing for the purpose. Special Order No. 12-a directed that district boards in Minimum-Price Area No. 1 establish rules and regulations incidental to the sale and distribution of coal by code members within such districts by Jan. 13; provided for coordination of such rules and regulations to begin Jan. 14; and announced a public hearing by the commission on Jan. 16 for the purpose of approving, disapproving or modifying them. Special Order No. 13-a required the district boards within Minimum-Price Area No. 1 to establish proposed minimum prices by Jan. 10 for approval, disapproval or modification by the commission; provided for coordination of the proposed minimum prices beginning Jan. 13; and announced a public hearing by the commission on Jan. 20 to determine the proper action to be taken on coordinated minimum prices.

The dates set in these orders were subsequently postponed, the revised schedule reading as follows:

Jan. 17—District boards submit rules, regulations and wholesale discounts.

Jan. 17—Meeting of representatives of boards under direction of commission to coordinate rules, etc.

Jan. 18—Representatives of boards report on coordination of rules.

Jan. 20—Hearing on rules, regulations and discounts.

Jan. 25—All district boards submit classification standards.

Jan. 27—Hearing on proposed classification standards.

Jan. 28—Boards submit prices to commission.

Jan. 28—Meeting of representatives of boards under direction of commission for coordination of prices.

Feb. 8—Representatives of boards report on coordination of prices.

Feb. 10—Hearing on prices.

General Order No. 14 sets up rules and regulations governing district boards' budgets and assessments. Released Jan. 22, it directed that district boards file with the commission within fifteen days a proposed budget of expenses of administering the code and the statistical bureau in each district for the calendar year 1936.

Other Areas Invited to Join Code

Special Orders Nos. 7, 8, 9, 10 and 11 of the commission take cognizance that coal producers with mines in Alaska, Arizona, Idaho, Oregon and California have not hitherto been considered with respect to compliance with the coal act. Therefore, these orders provide that producers in those areas receive proper notification and be given permission to accept membership in the code by Feb. 15; producers filing acceptance by that date being considered code members as of Oct. 31 last. Alaska and Oregon members will be assigned to District 23 (Washington); Arizona members to District 20 (Utah); Idaho members to District 19 (Wyoming), and California members are to report direct to the secretary of the commission at Washington.

Four more district boards have set up statistical bureaus, leaving only two lacking such features—districts 18 (New Mexico) and 21 (North and South Dakota, where no board has been organized).

In response to an inquiry as to whether, if a district board should establish prices higher than those approved as minimum prices by the commission, a producer who sold at prices less than those established by the board but not less than those approved by the commission as minimum prices would violate the code, the commission ruled that setting supposed minimum prices by a district board higher than those approved by the commission would be void and in violation of the law. The commission concedes that the f.o.b. mine price of a certain grade or size of coal may vary, depending upon the consuming market into which it is to be shipped, but "there is only one schedule of minimum prices." In regard to sales of bituminous coal to employees, Acting Chairman Tetlow ruled as follows: "The commission finds no authority for producers to make or for the commission to approve any prices for coal to employees which would cause a deviation below the minimum price schedule as established by the commission."

Commenting on the decision in the case

Coming Meetings

- Eastern Ohio Coal Operators' Association: annual meeting, Feb. 10, Cleveland, Ohio.
- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 17-20, 29 West 39th St., New York City.
- Central West Virginia Coal Mining Institute: annual meeting, March 7, Waldo Hotel, Clarksburg, W. Va.
- Canadian Institute of Mining and Metallurgy: annual meeting, March 17-19, Chateau Laurier, Ottawa, Ont., Can.
- American Mining Congress: annual convention and exposition, May 11-15, Cincinnati, Ohio.
- Big Sandy-Elkhorn Coal Operators' Association: annual meeting, June 2, Ashland, Ky.
- Mine Inspectors' Institute of America: 27th annual convention, June 29-30 and July 1, Shirley-Savoy Hotel, Denver, Colo.

of the Pittsburgh Terminal Coal Corporation and other code members that became parties to the complaint, wherein the U. S. District Court at Pittsburgh, Pa., restrained collection of the tax pending Supreme Court action, Chairman Hosford said the petitioners in this case alleged that previous court orders restraining collection of the tax placed code members at a disadvantage in competing with nonmembers protected by court orders. They asserted, he added, that the interest of code members required to pay the tax at this time would be jeopardized because Congress made no provision for immediate repayment of the tax collected in the event that the Supreme Court of the United States held the act unconstitutional.

The National Conference of Bituminous Coal Producers, supporter of the Guffey act, expresses confidence in the validity of the act in a statement issued Jan. 10 in which it says it feels no apprehension following the Supreme Court decision invalidating the AAA. The statement points out "the apparently studied purpose of the court to make it clear" that the commerce clause was not involved in the AAA decision.

"The findings of fact by the trial court in the Carter case," says the statement, "make these supporters confident that the Guffey act will withstand all tests," this feeling being strengthened by "the deep conviction the code members have that Sec. 3 of the act is an exercise by Congress of the power to tax in the true sense of the word. . . . With 252,000,000 tons of acceptances reported by the commission, and an estimated annual production of captive coal of 50,000,000 tons, code acceptances are 81 per cent of the commercial production."

House Recommends Funds

In the budget message to Congress, President Roosevelt asked for a total of $1,595,000 for the coal commission, consisting of a specific request for $1,155,000 for commission activities in the next fiscal year and a deficiency appropriation of $440,000 for administration of the coal act during the balance of the current fiscal year. The House Appropriations Committee today recommended an appropriation of $990,000 for the next fiscal year, despite vigorous objections in committee to the creation of statistical bureaus by the commission. Representative Scrugham, of California, who acted as chairman of the subcommittee which held hearings on the commission's request, suggested that the coal statistics division of the U. S. Bureau of Mines could be utilized by the commission. Dr. John W. Finch, director of the Bureau of Mines, expressed the belief that the coal section could be expanded at slight cost to meet the commission's requirements. Nevertheless, the proposed appropriation was not reduced in expectation of fulfillment of the suggestion.

The deficiency appropriation was passed by the House last week. It carried a stipulation, however, that in the event the Supreme Court declares the Guffey act unconstitutional, all unexpended funds appropriated to the commission shall immediately revert to the Treasury.

Budget figures by the Treasury Department show an estimate of tax receipts from the bituminous coal tax for the fiscal year 1936, ending June 30 next, of $5,600,000, and for the fiscal year 1937 of $12,300,000. No explanation was given however, as to how these figures were arrived at.

The commission moved its headquarters on Jan. 15 from the Carry Building to the Investment Building, where it recently was given space to accommodate increased personnel.

Dr. Wilbert J. Huff

Personal Notes

J. G. Bradley, president, Elk River Coal & Lumber Co.; William G. Caperton, vice-president, Slab Fork Coal Co., and James D. Francis, president, Island Creek Coal Co., have been named as members of the board of directors of the Southern States Industrial Council, which has headquarters at Nashville, Tenn.

A. R. Brown, connected with the safety department, coal-mining division, Tennessee Coal, Iron & Railroad Co., has been appointed a member of the board of examiners, Alabama State mining department, succeeding Ed. Flynn, resigned.

Joseph Curry has been made safety inspector for the Kanawha Coal Co. at Hugheston, W. Va.

George H. Esser was elected secretary of the Virginia Coal Operators' Association at a meeting of the board of directors held Jan. 20 at Norton, Va. He succeeds Charles B. Neel, deceased. Mr. Esser was formerly vice-president of the Esser Coke Co., Esserville, Va. At the same meeting, E. H. Robinson was reelected assistant secretary.

George P. Fitz, general manager, Ajax Coal Co., was elected president of the Hazard Coal Operators' Association at the annual meeting of the organization. Other officers elected are: vice-president, D. T. Pritchard, general superintendent, Algoma Block Coal Co.; secretary, A. E. Silcott. The treasurer is Swift Parrish.

Dr. Wilbert J. Huff, of the engineering faculty, Johns Hopkins University, has been appointed chief chemist of the explosives division of the U. S. Bureau of Mines. Dr. Huff was a member of this division, in charge of chemical work at the Pittsburgh Station, after the World War. He is a graduate of Yale College, with general honors, and special honors in chemistry, and was Loomis Fellow in Yale University, from which he received the degree of Doctor of Philosophy in 1917. In 1924, Dr. Huff initiated the work of the department of gas engineering, Johns Hopkins University, which he has headed since that time, and has served as a consultant on chemical and engineering problems in the gas and fuel industries. Dr. Huff will direct research by the Bureau of Mines on the ignition and propagation of gaseous explosions, inflammable limits of gases and vapors, permissibility of explosives for use in the mineral industries, and other problems related to explosives or gas explosions.

Douglas K. Huntress, son of Carroll B. Huntress, president, Appalachian Coals, Inc., has joined the Northern Illinois Coal Corporation as fuel engineer. A graduate of Brown University, class of 1931, the younger Mr. Huntress was formerly an engineer with the Standard Oil Co. and later sales engineer with the Iron Fireman Mfg. Co.

J. K. Johnstone and Dabney Ramsuer have been appointed associate mine inspectors in Alabama, according to an announcement by William B. Hillhouse, chief inspector. A third additional member of the inspection force has been selected, but his appointment has not been confirmed. This will give the State mining department five associate inspectors. The appointments are for three-year terms.

William E. Jones, superintendent, Gilberton colliery, Philadelphia & Reading Coal & Iron Co., has been appointed inspector of leased mines and other properties of the company. He assumed his new duties, in the engineering department, on Jan. 10.

Herbert E. Kynor was appointed vice-president of James H. Pierce & Co., engineers and mine managers, Scranton, Pa., effective Jan. 1.

O. O. Malleis, manager of the inspection division of Appalachian Coals, Inc., has been granted a leave of absence to join the staff of the Bituminous Coal Producers' Board for District 8 (Southern No. 2). He will undertake to standardize coal analyses and assist in the classification of coals.

Oscar F. Ostby, vice-president, Electric Furnace-Man, Inc., was unanimously elected president of Independent Anthracite Coals, Inc., on Jan. 17 at the offices of the sales agency in Wilkes-Barre, Pa. He succeeds Donald Markle, president, Jeddo-Highland Coal Co., who, in announcing Mr. Ostby's election, stated that it had been evident for some time that the organization required a president who could give his full time to its interests. Mr. Ostby assumes his new office on Feb. 1, after eight years' connection with the Electric Furnace-Man, Inc.

James B. Smith, Burlingame, Calif., has resigned the presidency of the Royal and Spring Canyon coal companies, of Utah, and will be succeeded by Charles M. Cadman, San Francisco, Calif. The dual companies have plants in Carbon County and offices in Salt Lake City.

Union Pacific Improvements To Increase Output

Improvements costing approximately $900,000, including construction of a new steel tipple at Reliance, Wyo., and a new power plant at Rock Springs, Wyo., will be made by the Union Pacific Coal Co. this year, according to an announcement on Jan. 11 by Eugene McAuliffe, president of the company. In addition, several of the company's mines will be reconditioned, said Mr. McAuliffe, in anticipation of producing in excess of 3,000,000 tons of coal this year. In 1935 the company's output totaled 2,888,000 tons, an increase of 20 per cent over production in the preceding year.

New Preparation Facilities

CORNETT-LEWIS COAL CO., Louellen, Ky.: contract closed with the Morrow Mfg. Co. for four-track five-grade tipple equipped with shaker screens, Tyler 400 vibrator, loading booms, slack and rescreen conveyor, refuse conveyor and slack conveyor to storage bin; capacity, 250 tons per hour.

MATHER COLLIERIES, Mather, Pa.: contract closed with the Interstate Equipment Corporation for slate-disposal aerial tramway 1,600 ft. long equipped with two 100-cu.ft. self-dumping tram cars; capacity, 256 tons per hour.

SAHARA COAL CO., Harrisburg, Ill.: contract closed with the McNally-Pittsburg Mfg. Corporation for tipple and cleaning plant for either or both shaft or strip coal. Equipment will include three McNally-Norton automatic washers for the 6x0-in. size with a capacity of 600 tons per hour; three Christie dryers for the ⅜x0-in. fraction with a capacity of 100 tons per hour; sizing equipment for eight primary sizes, with selective mixing of any sizes and provisions for loading any size or mixture of sizes in box cars; and special primary and secondary McNally-Pittsburg crushing equipment. Over-all capacity of the plant is 825 tons per hour. It is to be completed by June 1.

SENECA COAL & COKE CO., Broken Arrow, Okla.: contract closed with the McNally-Pittsburg Mfg. Corporation for strip-mine tipple for preparing and loading five sizes of coal on five tracks, with McNally-Norton vertical-pick breaker for reducing large lumps; capacity, 300 tons per hour; to be completed April 1.

YOUGHIOGHENY & OHIO COAL CO., Osborne, Pa.: contract closed with the Fairmont Machinery Co. for new tipple for preparing and loading five sizes of coal simultaneously, four over loading booms. Other equipment includes vibrator for pea and complete crushing, remixing and recirculating facilities. Capacity of the plant, now under construction, is 500 tons per hour.

Old Ben Mine Flooded

Slight gains against the inflow of water into the flooded No. 18 mine of the Old Ben Coal Corporation, Johnston City, Williamson County, Ill., were reported late in January after three weeks of work following the collapse of seals against water collections in neighboring worked-out operations on Jan. 2. Water in troublesome quantities made its appearance in the field late last year, and is believed to have worked north from the southern outcrop of the coal measures through mines worked out or closed in past years. To check seepage into the No. 18 mine, a series of seals were constructed in November and early in December. These broke on Jan. 2, letting the impounded water into No. 18 and endangering the neighboring Franco No. 1 mine of the Franco Mining Co. as well.

Hundreds of bushels of corn, soy beans and sawdust were introduced behind the broken seals through a drillhole on Jan. 19 in an attempt to plug the breaks, but proved ineffective. Meanwhile, 1,500-gal. water hoists were installed in the shaft, and after eleven days' work, removing 5,000,000 gal. per day, had gained 3 in. on the flood. A surface break on Jan. 24 was reported to have formed a barrier between No. 18 and the Franco No. 1 mine, cutting off the flow of the water into the latter operation. Increased progress has been made in bailing operations at No. 18 since the surface break, and it is hoped that operations can soon be resumed at Franco No. 1.

Bootleg Miners Jailed

Charged with illegal mining and trespassing, four men arrested on the property of the George F. Lee Coal Co., Plymouth Township, Pa., were held under $300 bail and fined $10 each on Jan. 7. In default, they were committed to Luzerne County prison by Alderman Frank B. Brown.

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TRADE COMMISSION ADVISES GOVERNMENT GAS CONTROL

THAT the government take immediate steps to control or regulate the natural gas industry is recommended by the Federal Trade Commission as the result of an investigation lasting several months. The commission's findings are shown in a 575-page volume containing statistics and data covering the financial as well as the physical set-up of all the gas-producing companies in the country.

The recommendations of the commission are based on what purport to be facts indicating waste of natural gas, excessive cost of production, unregulated monopolistic control of gas and pipe lines, discrimination in the purchase of gas from independent producers, and unregulated competition in the construction of pipe lines.

To control the gas itself, the commission suggests that producing States enter into compacts similar to the oil agreements now in existence, with federal regulations to limit the quantity of gas produced or moved in excess of State quotas. It is also urged that gas pipe lines operating in interstate commerce be subject to federal regulation in respect to transportation charges, and that the same should apply to the financial set-up and securities of the gas companies.

Restriction of Oil Imports Backed by Coal Men

Both branches of the coal industry, anthracite and bituminous, are solidly supporting the bill to restrict imports of petroleum and its products and to increase excise taxes on such imports (H.R. 10483) introduced in the House Jan. 22 by Representative Wesley E. Disney of Oklahoma. The bill proposes to increase the duty on imported crude and fuel oil from ½c. to 1c. per gallon and would apply the impost on all fuel oil used by vessels, which now comes in duty free. It also carries a tax of $2 per ton on imported asphalt, now coming in free, a commodity from which a considerable quantity of fuel oil is derived. In a statement issued the same day, John D. Battle, executive secretary, National Coal Association, declared that his organization will join with all other proponents in earnest advocacy of the passage of this measure or any bill of similar purport, by Congress at this session.

Imports of foreign petroleum and its products, a large portion of which comes in duty free, is not a matter of concern to the oil industry alone, says the statement. "Millions of tons of bituminous coal have been displaced by cheap foreign oil and thereby thousands of American miners have been made jobless," it continues. "Furthermore, imports of oil, by depressing the price level of domestic oil in certain areas, by that very fact increases the unfair disadvantages with which coal, with a high wage level and large labor factor, is now burdened, in competition with nearly laborless and wholly unregulated fuels—gas and oil."

Mr. Battle's statement was issued following a meeting of a subcommittee of the public and government relations committee of N.C.A. with a committee from the Anthracite Institute in New York City, at which ways and means to support the bill were considered. Additional conferences are to be held with other interested industries in support of the Disney measure. Representing N.C.A. at the conference were the chairman of the committee, Charles O'Neill, president, Eastern Bituminous Coal Association; A. F. Kempe, Logan Coal Co.; J. P. Bradin, Pennsylvania Coal & Coke Corporation, and Mr. Battle; the Anthracite Institute was represented by Charles Dorrance, president, Penn Anthracite Mining Co.; F. W. Leamy, senior vice-president, Hudson Coal Co.; Arch E. Sloat, Lehigh Valley Coal Sales Co., and Louis C. Madeira, 3d, executive director of the institute.

The price of heating oil at retail was advanced ¼c. a gallon on Jan. 27 in New York City and Westchester County, New York. Nos. 2 and 3 heating oil were increased in New York City to 6¾c. a gallon and No. 4 to 6¼c., while in Westchester Nos. 2 and 3 were advanced to 7c. and No. 4 to 6¾c. The Standard Oil Co. of New Jersey advanced the price of No. 1 heating oil in tank-car lots ¼c. a gallon on Jan. 25 to 5¼c. at Baltimore, Md., and Norfolk, Va. Leading distributors also advanced the price of kerosene in tank-car lots ¼c. a gallon at Philadelphia, Pa.; Baltimore, Norfolk and Wilmington, Del.

Anthracite Men Name Inglis To Head Negotiators

W. W. Inglis, president, Glen Alden Coal Co., has been chosen for the fourth successive time to act as chairman of the anthracite producers' committee that will meet with representatives of the United Mine Workers to negotiate a new wage agreement. Although Major Inglis requested the committee to appoint another member of the wage scale group to the chairmanship, the conferees, who met in New York City on Jan. 7, were unanimous in choosing him to head the operator negotiators. The producers' committee will meet the union representatives in February, the exact date to be set after the union's international convention has approved the scale committee report of the tri-district convention, presented Dec. 6.

In addition to Major Inglis, the operators' committee includes the following: Ralph E. Taggart, president, Philadelphia & Reading Coal & Iron Co.; Michael Gallagher, president, Pittston Co.; J. B. Warriner, president, Lehigh Navigation Coal Co.; James H. Pierce, president, East Bear Ridge Collieries Co.; A. B. Jessup, vice-president, Jeddo-Highland Coal Co.; and James Prendergast, president, Susquehanna Collieries Co.

1,929,461 Tons; None Killed

Six coal mines comprising the Republic Steel Corporation's operations near Uniontown, Pa., produced 1,929,461 tons of coal in 1935 without a fatal accident, according to E. B. Winning, manager of mines. The company's mines, which employ approximately 1,500 men, also reduced the total number of lost-time accidents by 68 per cent last year. Accident frequency for the year was 31.84, and accident severity, 2.58. Superintendent Robert McVicker and employees of the Russelton mine received a trophy for the best record in the Republic group at a safety and operating dinner held Jan. 18 at the Uniontown Country Club. J. L. Hamilton is safety engineer for the mines.

Death Hits McGraw-Hill Staff

Death struck twice at the McGraw-Hill editorial staff last month. Fred R. Low, editor emeritus of *Power*, passed away on Jan. 22 after an illness of several years. Wallace Thompson, editor, *Ingeneria Internacional*, and NRA representative at Washington for the McGraw-Hill publications during the hey-dey of the Blue Eagle régime, died on Jan. 7, a victim of pernicious anemia.

Mr. Low, who served as chief editor of *Power* from 1888 to 1930 and won wide recognition in the combustion field, was a pioneer in developing the technical aspects of that field and in raising the professional standards of the power-plant engineer. This he did without losing touch with the problems of the practical boiler-room man. He was past president of the A.S.M.E.; honorary member of the British Institution of Mechanical Engineers, receiving that award at a time there were only twelve men, including the late King George, holding such honorary membership; and former mayor of Passaic, N. J., where he died. Mr. Low was in his 76th year.

W. W. Inglis

Mr. Thompson, who was born 53 years ago, was in turn magazine editor, newspaper editor in Mexico, political correspondent for the Kansas City *Journal*, Paris correspondent for a number of American newspapers, vice-consul at Monterey, Mexico, and since 1927 editor in chief of *Ingeneria Internacional*. He was well known as an expert on Latin-American countries and had a great personal fondness for South America. When NRA was established, Mr. Thompson was detailed to Washington again to keep track of the manifold activities of that organization as they affected business and industry. His superb job of interpretive reporting during those hectic months was widely acclaimed.

New Mine for Grundy Field

Organization of the Oakwood Smokeless Coal Corporation, which plans to operate in the Grundy field of Buchanan County, Virginia, was completed during the second week of January. Officers of the new company are: W. W. Wood, president and general manager; Dr. J. E. Blaydes, vice-president, and Frank S. Easley, secretary-treasurer, all of Bluefield, W. Va. The operation is to be on the Levisa River at the mouth of Garden Creek, where a large tract of coal land has been leased. Mr. Wood stated that the company expects to be ready to ship as soon as the Norfolk & Western Ry. completes extension of its line from Grundy, Va.

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PERMISSIBLE PLATE ISSUED

ONE addition was made to the list of permissible equipment by the U. S. Bureau of Mines in December. The approval (No. 1526) was issued to the Jeffrey Manufacturing Co. on Dec. 20 and covers the Jeffrey Type BSM, Class 20, Form H locomotive.

Miners Sue Judge and Sheriff; More Mines on Union Side

Alleging illegal imprisonment and abuse, fourteen Kentucky coal miners brought suit Jan. 2 in the federal district court at London, Ky., against Circuit Judge James A. Gilbert, of Pineville, Ky., and Sheriff Theodore R. Middleton, of Harlan County, Kentucky, for damages totaling $350,000. One of the suits is directed at Judge Gilbert, and the rest at Sheriff Middleton. Each suit is for $25,000.

The arrests were the outgrowth of union efforts at organization in Harlan County nearly a year ago. T. C. Townsend, attorney for the plaintiffs, who is chief counsel for the United Mine Workers in West Virginia, said John L. Lewis, president of the miners' union, approved the actions. Additional suits for at least $150,000, said Mr. Townsend, would be filed against Judge Gilbert, Sheriff Middleton, other public officials and some of the coal companies.

An automobile containing several miners connected with the Independent Miners' Union was fired on from ambush on Jan. 17 as it approached the Kington Coal Co. mine at Morganfield, in western Kentucky. Several volleys were fired, killing one of the miners. Three men were arrested Jan. 18 charged with complicity in the shooting. A similar attack had occurred on Jan. 13. The mine, which formerly employed members of the United Mine Workers, reopened in the second week of January, with "independents" employed, after having been shut down since Sept. 22, 1935.

Governor Chandler ordered detachments of troops from Hopkinsville and Marion to the scene of the disorder on Jan. 20. Sheriff John Luttrell of Union County reported that men were "roaming the county with high-powered rifles," and Governor Chandler emphasized that he was assigning troops as a last resort to prevent the situation from getting beyond control.

The Nelson Creek Coal Co., Nelson, Ky., resumed operation Jan. 6 under a wage contract with the United Mine Workers, making the sixth company in Muhlenberg County to sign a union contract since the walk-out in September. The Pacific Coal Co., at Mercer, signed up a week earlier. About 1,250 miners are at work in the county under contracts and nearly 3,000 are idle.

Progressives Enjoined

A permanent injunction decree restraining the Progressive Miners from interfering with operation of the United Electric Coal Co.'s Red Ray No. 13 mine, near Freeburg, Ill., was filed Jan. 21 in the U. S. District Court at East St. Louis, Ill., by Judge Fred L. Wham. The U. S. Circuit Court of Appeals on Oct. 28 last reversed a decision in which Judge Wham denied an injunction and ordered it granted. Named as defendants in the suit are 55 individuals, including officers and members of the Progressives.

The decree enjoins the defendants

from killing, injuring, threatening or intimidating any past or present officers or employees of the company and restrains them from trespassing on or damaging any of its property or blocking or attempting to block any road, highway or railroad leading to or from the company's mines. The injunction also enjoins the defendants from impeding any movement of coal or supplies to or from the company's property.

A.C.I. Holds Stoker Symposium

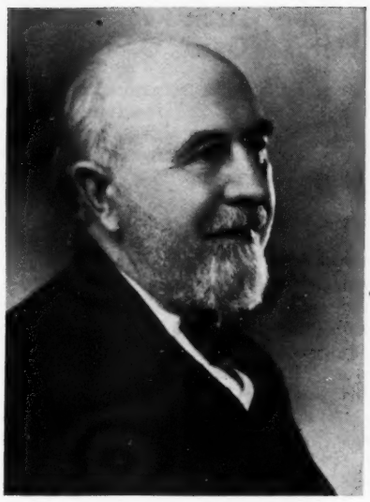
A symposium on stokers, sponsored by Appalachian Coals, Inc., held Jan. 6 at the Queen City Club, Cincinnati, Ohio, attracted an attendance of nearly 100 representatives of coal companies, research agencies and stoker manufacturers from 30 cities. J. E. Tobey, manager, A.C.I. fuel engineering division, presided at the meeting, which was the twelfth in the series sponsored by the agency to effect cooperation among its engineers, the engineering representatives of companies affiliated with it, and engineers of allied industries.

Besides the symposium program, designed to correlate development and research efforts toward increasing satisfaction from the use of household stokers, there were addresses on "Coal Selection and Burning in Government-owned Plants," J. F. Barkley, supervising engineer, U. S. Bureau of Mines, and "Preliminary Findings in the Program of Bituminous Coal Research, Inc.," R. A. Sherman, Battelle Memorial Institute, Columbus, Ohio.

Allied industries and organizations represented included: Andejeski Stoker Co.; Bardes Foundry Co.; Butler Mfg. Co.; Carnegie Institute of Technology; Cambustioneer, Inc.; Committee of Ten —Coal and Heating Industries; Chesapeake & Ohio Ry.; Engineering Committee of the Stoker Manufacturers' Association; Fairbanks, Morse & Co.; Holcomb & Hoke Mfg. Co.; Iron Fireman Mfg. Co.; Lane Automatic Heating Co.; Louisville & Nashville R. R.; Moores-Coney Corporation; Norfolk & Western Ry.; National Cash Register Co.; Purdue University; Schwitzer-Cummins Co.; Shepard Stoker Distributing Co.; University of Michigan; Union Gas & Electric Co.; Viking Mfg. Co., and Will-Burt Stoker Co.

Differential Action Deferred

The North-South wage differential commission set up under the Appalachian agreement met at the Shoreham Hotel, Washington, D. C., on Jan. 6, but was not prepared to make a report. After an all-day session, it was agreed that reports on differentials on all complaints filed with the commission should be made not later than Sept. 1, 1936, and that the joint wage conference be subject to call by the commission. The sessions were presided over by Chairman D. C. Kennedy, executive secretary, Kanawha Coal Operators' Association, and S. C. Higgins, assistant secretary. Dave McDonald acted as secretary in the absence of Thomas Kennedy, secretary-treasurer, United Mine Workers.



The late C. B. Neel

Obituary Notes

C. B. NEEL, 57, secretary of the Virginia Coal Operators' Association, a position he had held for twelve years, died Jan. 11 in a hospital at Pennington Gap, Va., after a brief illness. He had been in poor health for about a year.

JONATHAN JENKINS, 68, associated with his brothers, William and James, in the McNitt Coal Co., Frostburg, Md., died Jan. 6 in a hospital at Baltimore, as the result of a fall on an icy sidewalk. He had long been prominent in the coal industry in western Maryland and Kentucky.

GEORGE J. WALKER, 68, general manager, Splash Dam Coal Corporation, Splash Dam, Va., died Jan. 16 in Johns Hopkins Hospital, Baltimore, Md., from pneumonia which developed while he was recovering from an operation. He had long been identified with the coal-mining industry in southwestern Virginia.

JOHN E. MCQUADE, 51, superintendent of the Panama mine of the Ben Franklin Coal Co., Moundsville, W. Va., died Jan. 15 at a local hospital from a throat infection following an attack of quinsy.

GLENN W. TRAER, 67, vice-president, Truax-Traer Coal Co., Chicago, died Jan. 10 at Evanston, Ill., from pneumonia which developed from a severe cold.

ELMER M. TRUAX, vice-president, Truax-Traer Coal Co., whose headquarters were at Minot, N. D., died Jan. 3 at Evanston, Ill.

HENRY E. HARMAN, 76, president, Warrior Coal Co., Warriormine, W. Va.; Yukon-Pocahontas Coal Co., Yukon, W. Va.; and the New Alma Coal Co., McCarr, Ky., died Jan. 12 at his home, in Tazewell, Va., after an illness of six weeks. He became a prominent figure in the coal industry in 1905, when he was appointed general manager of the Spring Coal Mining Co., of West Virginia. He also was at one time president of the Tug River Coal Operators' Association.

ANDREW K. MORRIS, 56, formerly general manager of the Pennsylvania Coal Co., now the Pittston Co., and more recently traffic commissioner of the Anthracite Operators' Conference, died Jan. 12 at his home in Ridgewood, N. J., of heart disease. He resigned from the Pennsylvania company in 1928, after seven years' service as general manager. He recently retired from the Anthracite Operators' Conference because of ill health.

Modifies Bonus System

In an effort to strengthen interest in cutting costs for labor, material and power, the Union Pacific Coal Co. has modified its bonus system whereby payments will be made monthly instead of annually, effective January, 1936 (see *Coal Age*, February, 1935, p. 98). Under the new arrangement, the mine showing the lowest ratio of cost for labor, material and power for the month, as compared with similar costs for the month immediately preceding that covered by the award, will receive $150; the next lowest will be awarded $100; and third prize will be $50.

All underground and surface employees paid on a day wage or monthly basis are eligible for bonus awards, but men paid on a monthly basis, whether employed above or below ground, are excluded. To be eligible, an employee must have worked not less than five days during the calendar month covered by the award. Employees unable to work on account of illness or accident, or who have been given leave of absence for good cause, will be considered as being in service. The statement of the relative standing of the mines will be posted on the 20th day of each month, beginning in February, the awards being made as soon thereafter as convenient.

Inspector for Buchanan County

In order to be able to assign a mine inspector to the coal-mining operations now being developed on an extensive scale in Buchanan County, Virginia, it is proposed to grant the State Bureau of Labor and Industry an additional $5,800 in the budget for the biennium 1936-38. The budget, which was submitted by Governor Peery to the General Assembly, which convened Jan. 9 for a 60-day session, also carries an increase of $9,670 per annum to enable the bureau to cooperate more fully with the federal employment service.

Lignite Study Proposed

A bill appropriating $100,000 to promote studies and experiments with a view to "the development of a commercially practicable carbonization method of processing sub-bituminous and lignite coal so as to convert such coal into an all-purpose fuel, to provide fertilizers, and obtain such other byproducts thereof as may be commercially valuable" was introduced in the Senate on Jan. 16 by Senator Lynn J. Frazier of North Dakota. The measure, which was referred to the Committee on Mines and Mining, authorizes the U. S. Bureau of Mines to conduct the investigations on

fts own initiative and in cooperation with individuals, State institutions, laboratories and other organizations.

Other objectives sought are "the development of efficient methods, equipment, and devices for burning lignite or char therefrom; and determining and developing methods for more efficient utilization of such sub-bituminous and lignite coal for purposes of generating electric power." The Bureau of Mines is further authorized, under the general direction of the Secretary of the Interior, to erect such plants, construct and purchase such machinery and equipment, and to take such other steps as may be deemed necessary to carry out the purposes of the act.

Industrial Notes

HOWARD S. JOHNSON, vice-president of the American Hoist & Derrick Co., retired from active service with the company on Jan. 1. His place on the board of directors has been filled by Rolf E. Ljungkull, chief engineer.

IRA D. LEFEVRE, general auditor of the General Electric Co. since 1920, was elected comptroller, effective Jan. 1. He succeeds S. L. Whitestone, who retired Dec. 31, after nearly a half century's service with the company. The following have been elected assistant comptrollers: FRANK B. CLIFFE, JOHN G. FARRAR, HENRY W. LELAND and H. A. MACKINNON.

General offices of the REPUBLIC STEEL CORPORATION were removed Jan. 25 from Youngstown, Ohio, to Cleveland, occupying floors 13 to 16 in the former Medical Arts Building, recently renamed the Republic Building.

FOSTER WHEELER CORPORATION announces the appointment of James Cleary as special representative in the power equipment division with headquarters at 165 Broadway, New York City.

CENTRAL FOUNDRY CO. announces the removal of its Pacific Coast sales office from San Francisco to 278 Fourth St., Oakland, Calif., with John Ponsaing, district sales manager, in charge.

COAL MINE EQUIPMENT SALES CO., Beasley Building, Terre Haute, Ind., has moved to larger quarters in the same building to take care of an augmented sales and office staff.

Balks at PWA Allotment For Oil-Burning Plant

Employees of coal mines and railroads in Illinois will be deprived of 46,000 man-hours of labor and $35,600 a year in wages by the annual market loss of 15,000 tons of coal if the proposed municipal electric plant equipped with diesel oil-burning engines is built at Jacksonville, Ill., says the Southern Illinois Reciprocal Trade Association in a protest on Jan. 13 to Public Works Administrator Harold L. Ickes. PWA is urged to rescind an allotment of $420,000 to the city to finance construction of the plant.

Allen & Garcia Reorganized; Fletcher Opens Own Office

As a result of a reorganization of the Allen & Garcia Co., consulting engineers, Chicago, John A. Garcia and H. B. Cooley have purchased the interests of their associates in the company and J. H. Fletcher, who joined the organization in 1913, has established an office as independent consulting engineer at 749 McCormick Building, Chicago. Charles La Mena and H. F. Hebley also have retired from the old Allen & Garcia Co., but have announced no new connections as yet. Mr. La Mena was treasurer of the company for many years and Mr. Hebley served as a preparation specialist.

Mr. Fletcher was graduated from Armour Institute of Technology in 1911. Prior to joining the A. & G. group, he was associated with the Commonwealth Edison Co., B. J. Arnold & Co., and managed a wood-preserving plant in Louisiana. He became assistant to Mr. Garcia in 1917, handling reports and appraisal work, and mining problems other than those relating to preparation. When the Wildwood mine was conceived, Mr. Fletcher was placed in charge of the development and construction program. Following this, he spent six months in Europe, liquidating the A.&G. contract with the Soviet government and studying mining conditions in Germany, Belgium and England.

Reorganization Completed

Reorganization of the Consolidation Coal Co. was completed on Jan. 13 with the recording in 25 jurisdictions of a deed conveying the property of the old company's trustees to the newly formed corporation. The mines, docks, buildings and all other physical properties as well as the mineral freeholds and leases are conveyed. The company, which had been in receivership since June, 1932, announced the plan of reorganization on May 10, 1935 (*Coal Age*, June, 1935, p. 270).

Bans Black Powder in Utah

The Utah Industrial Commission has denied a petition of wagon-mine operators in that State who sought permission to use black powder in their mines, which is forbidden by State coal-mine regulations. The Utah Coal Operators' Association vigorously attacked the proposed change at a public hearing in Salt Lake City last October, and recently B. P. Manley, secretary of the association, filed a brief setting forth arguments against modification of the regulations.

Ohio State Offers Scholarship

Ohio State University announces that applications of candidates for the Elizabeth Clay Howald scholarship will be received until March 1. The scholarship, which was endowed by the late Ferdinand Howald, an alumnus of the university, in memory of his mother, carries an honorarium of $3,000 annually. Any person who has shown marked ability in some field of study and has in progress work that promises to yield an important contribution to knowledge is eligible. If a candidate has been a student or a member of the staff at Ohio State he may carry on his investigation at the university or, subject to approval of the graduate council, elsewhere either in this country or abroad where superior advantages for his particular field of study are available. Candidates who have never been connected with the university, however, must carry on their investigations at Ohio State.

Koppers to Run Sonman Mines

Operation of the two mines of the Sonman Shaft Coal Co., near Portage, Pa., which have been idle since July, 1935, was taken over on Jan. 9 by the Koppers Coal & Transportation Co. Under the old management the daily capacity of the mines in 1934 was: Sonman Shaft, 1,100 tons; Sonman Slope, 1,700 tons. The new arrangement involves management only, not ownership.

Colorado Blast Traps Eight

Eight miners were entombed by a mysterious blast on Jan. 20 in the Monarch mine of the National Fuel Co., near Louisville, Colo. Six of the men were working on concrete firewalls erected to shut off a part of the mine where a fire had been burning for years when the explosion occurred; the other two were digging coal. Rescue workers had recovered the bodies of seven of the victims on Jan. 23; the body of the remaining victim was believed to be buried under débris. The explosion occurred just before the day force was about to start work.

Heavier Coal Shipments Forecast

Shipments of coal and coke during the first quarter of this year are estimated by Regional Shippers' Advisory Boards at 1,920,772 cars, compared with 1,886,561 cars actually shipped in the first quarter of last year. The prospective increase in shipments is 1.8 per cent.

Supports Equalized Time

Basing his decision on the "oft-expressed desire of the miners' union for equalization of working time," James A. Gorman, umpire of the Anthracite Board of Conciliation, on Jan. 16 dismissed a grievance involving overtime at the Lattimer colliery of Pardee Bros. & Co., near Hazleton, Pa. Certain employees of the colliery asked nine hours' wages for an eight-hour workday pursuant to an agreement with the company concerning oiling and tending motors, harnessing and taking mules to the stables after quitting time. The work actually required an hour more than the basic eight hours called for in the contract, but Umpire Gorman refused to uphold the complaint on the ground that last year a new agreement was made by the company and the U.M.W. calling for equalization of working time and elemination of overtime work.